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OHIO UNIVERSITY

College of Engineering and Technology

LEAK DETECTION TECHNIQUE IMPROVEMENT STUDY
FOR SPACE VEHICLES

An Investigation and Study

for the

National Aeronautics and Space Administration
George C. Marshall Space Flight Center
Contract NAS8 - 11199

Athens, Ohio
September, 1966

* This report includes only the literature search and bibliography portion of the study, the technical part is presented under separate cover as the Annual Report 2-a, dated January, 1967.

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5

ABSTRACT

An extensive search of the literature published prior to 1962 on the subject of leak detection and related fields has been carried out. The information collected has been automatized by use of IBM cards and a computer so that information on any phase of this project can be readily available for use when needed.

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7

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INTRODUCTION

The search of the literature begun under NAS8-2563 has been continued under NAS8-11199 so that a listing of over 2,000 IBM entries and cross references on leak detection published prior to 1962 have now been listed and abstracted. Figure I shows the format of the abstract listings. The abstract number is given in the upper right hand corner. The numbers in the left hand corner are first the source reference number, then the last two digits of the year the article was published, and finally the subject classification number. Directly under this are listed the author or authors of the article. The complete source listing and title appear at the upper right center and the abstract and pertinent information on the article appears below this in paragraph form.

This report consists mainly of these abstracted articles, arranged in order of their abstract identification number. These articles have also been categorized into 97 subject classes and subclasses so that any particular type of leak detection information can be found easily. A listing of these classes and subclasses is given in Table I. In order to facilitate the sorting of these articles, each has been catalogued on both IBM title cards and IBM author cards.

Figure II and Figure III show the formats of these IBM cards. Each card carries the subject classification number of the article in columns 78-80, the source reference number in columns 73-75 and the last two digits of the date of publication in columns 76-77. The first 72 columns are reserved for either the title or the author of the article. So far over 190 independent sources of leak detection information have been surveyed. A complete listing of these sources is given in Table II by source reference number.

Subject sorting can be done on three levels by using only the first, the first and second, or all three digits of the subject classification number. The first number is a broad subject classification while the second and third break these down into smaller, more specific subclasses. The computer program which does this sorting has been written so that a complete printout of the useful articles is done by the computer at the time of the sort. The abstracts of these articles can then be looked up in the text of this report. The section on computer program information gives the details of the program used for the computer sorts.

Blears, J.
Leck, J. H.

J. Sci. Instr., Supl. 1 20-8 (1951)

General Principles of Leak Detection

The techniques of leak detection are reviewed, special emphasis being placed on methods for obtaining high sensitivity with simple apparatus. A theoretical analysis of the gas flow problem is supplemented by experimental results obtained by using two diffusion pumps in cascade. The importance of using constrictions and correctly positioning the gage is stressed and the losses of sensitivity due to virtual leaks, leaks in series and by-pass methods are considered. The relative sensitivities of different leak detection methods are tabulated. (auth.)

Deals with mechanical, gage type, leak detectors where pressure differences in the entire system must be measured. No discussion is given to locating individual leaks, only showing if system is leak tight.

FIGURE I

FORMAT USED FOR ABSTRACT INFORMATION SHOWING CROSS-REFERENCE NUMBER USED IN
IBM CLASSIFICATION AT TOP RIGHT

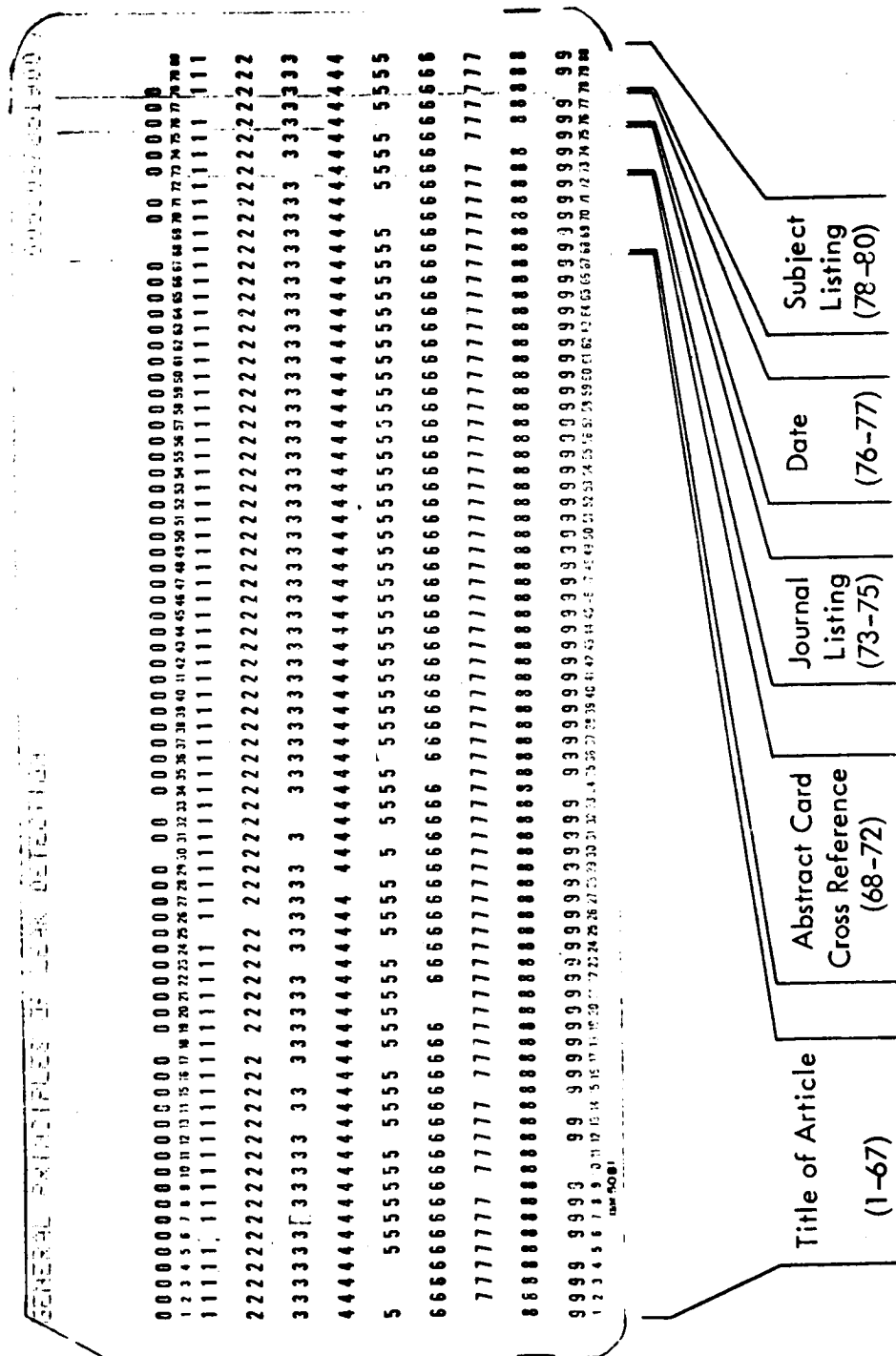


FIGURE 2

SAMPLE IBM TITLE CARD SHOWING FORMAT OF CHARACTER BREAKDOWN

13

FIGURE 3

APPENDIX I

Computer Program Information

A computer program has been written which will sort through the subject and/or author card decks and select the cards whose classification numbers correspond to those given by a control card. In this way a printed list of references can be obtained quickly.

The program is written for the IBM system/360 in Fortran IV (level E). The data deck contains a control card followed by the subject and/or author deck. A blank card is placed as the last card of the data deck and is used to stop the program.

The control card contains four numbers in integer format in the first four five column fields. The first number determines how many subdivisions are to be considered. If this number is 2 only the main and first subdivision will be considered. The next three numbers determine the main classification, the first subdivision, and the second subdivision to be listed on the output. If the control card contains the numbers 2,4,3, and blank, those cards whose main classification is 4 and whose first subdivision is 3 would be listed. The second subheading is not given because the first number on the control card (2) indicates that the process will not consider any division beyond the second.

TABLE I

SUBJECT CLASSIFICATION AND SUBCLASSIFICATION

1. Gas Detection

11. Thermal Conductivity

111.. Hot Wires

112. Thermistors

113. Thermocouples

114. Thermonic Emission

115. Thermal Expansion

116. Thermal Diffusion

12. Combustion Meters

121. Hydrogen Detectors

13. Ionization Detectors

131. Halogen Guns

132. Halogen Bridges

133. Ionization Gauges

134. Field Emission Devices

14. Electric, Magnetic, and Electromagnetic Devices

141. Vibrating Capacitors

142. Paramagnetic Detectors

143. Ultraviolet

144. Infrared

145. Tesla Coils and/or Spark Discharge

146. Resistivity and Impedance Detectors

147. Electric Conductivity

148. Photoelectric Processes

- 15. Analyzers
 - 151. Mass Spectrometers and Omegatrons
 - 152. Miniature Mass Spectrometers
 - 153. Chromatographs
 - 154. Chemical Responders and Reactions
 - 155. Microwave Devices
 - 156. Sonic Analyzers
 - 157. Interferometers
- 16. Olfactory Tracers
 - 161. Mercaptans
 - 162. Other Compounds
- 17. Optical Methods
 - 171. Luminescence
- 18. Flame Testing
- 19. Dyes and Other Color Change Methods
- 2. Radioactive Tracer Methods
 - 21. Radioactive Gases
 - 211. Kr85
 - 212. Radon
 - 22. Radioactive Detectors
 - 221. Alpha
 - 222. Beta
 - 223. Gamma
 - 224. Neutron
 - 23. Health and Safety
- 3. Liquid Leak Detectors

4. Acoustical Detection Systems

41. Passive

412. Sonic Listeners

413. Ultrasonic (translators)

42. Active

421. Sonic Injection

43. Active-Passive

431. Sonic Modulation of Leak Noise

44. Acoustical Transducers

441. Audio Microphones

442. Ultrasonic Microphones

443. Semiconductor Microphones

444. Seismic Devices

445. Directional Horns etc.

45. Related Circuitry

451. Correlation Detectors

452. Noise Immunity Circuits

453. Doppler Shift Sensitive Devices

5. Pneumatic and Hydraulic Devices

51. Manometers

52. Diaphragms

53. Soap Bubbles, and other Bubble Detection Methods

531. Techniques

532. Solutions and Mixtures

54. Pressure Gauges (spring type)

- 6. Gas Dynamics and Gas Properties
 - 61. Gas Dynamics
 - 611. Nozzle Dynamics for Detectors
 - 612. Gas Flow and Diffusion in Closed Pipes
 - 613. Gas Flow from and Around Leaks
 - 614. Supersonic Gas Flow
 - 62. Gas Properties
 - 621. Densities
 - 622. Diffusion Properties
 - 623. Ionization Potentials
 - 624. Other Electromagnetic Properties
- 7. Useful Circuitry
 - 71. Transistorization
 - 711. Amplifiers
 - 712. Level Sensing Circuits
 - 713. Indicator Circuits
 - 714. Power Supplies
 - 715. Economizers
- 8. Devices Related to Leak Detectors
- 9. Phenomena of Possible Applicability

TABLE II

Journal Listings with IBM Identification Number

001	Acta Chemica Scandinavica
002	American Gas Journal
003	American Industrial Hygenic Association Journal
004	Analytical Chemistry
005	Analyst
006	Annual New York Academy of Science
007	Annales De Radioelectricite
008	Applied Scientific Research
009	Applied Spectroscopy
010	Archives Biochemistry and Biophysics
011	Australian Journal of Physics
012	Australian Journal of Chemistry
041	Biochemical Journal
042	Brennstoff-Chemie
043	British Patent Office
044	British Journal of Applied Physics
045	Bulletin Academy of Polytechnic Science
046	Bulletin Academy Royal Belgique Cl. Science
047	Bulletin of the Institute of Chemical Research, Kyoto U.

- 048 Bulletin Laboratory Chim. Provinciali
- 049 Bulletin of the Society of Chimestry (France)
- 050 Bulletin of Society Science Bretagne
- 051 Boll. Lab. Chim. Provinciali

- 081 Cahiers de Physic
- 082 Canadian Journal of Physics
- 083 Canadian Journal of Research
- 084 Canadian Jouranl of Technology
- 085 Chemical Abstracts
- 086 Chemical Engineering
- 087 Chemical Engineering Progress
- 088 Chemical Metallurgy
- 089 Chemical Technology
- 090 Chemicke Listy
- 091 Chemicky Prumysl
- 092 Chemie
- 093 Chemiker-Zeitung
- 094 Chemistry in Canada
- 095 Chemistry and Industry
- 096 Chimia (Switz)
- 097 Chimestry and Industry (London)
- 098 Chimica et Industria

- 099 Ciencia
- 100 Civil Engineering
- 101 Collection Czechoslov Chemical Communications
- 102 Colloid Chemistry
- 103 Comptes Rendus
- 104 Chemical Metallurgy Engineering
- 105 C.R.Academy of Science (Paris)

- 121 Dechema Monograph
- 122 Disseratation Abstracts
- 123 Doklady Akadamy Nauk, SSSR
- 124 Drug and Cosmetic Industry

- 161 Electrical Engineering
- 162 Electronic Industries
- 163 Electronic Technology
- 164 Electronic World
- 165 Electronics
- 166 Electrotech U. Maschinenban
- 167 Elektrotechnik (Berlin)
- 168 Experimentia

- 201 Farm Science and Technology
- 202 Fonderie

- 240 Gas
- 241 Gas Age
- 242 Gas Chromatography
- 243 Gas Council Research Commun. (Eng.)
- 244 Gas Journal
- 245 Gas und Wasserfrah
- 246 Gas World
- 247 General Electric Review

- 281 Hochvakuum-Technology

- 320 IBM Journal of Research and Development
- 321 Indian Journal of Physics
- 322 Industrial Engineering Chemistry
- 324 Industrial Chemist
- 325 Industrial Chemistry Analytical Edition
- 326 Industrial Radio Engineering Proceedings
- 327 Instruments
- 328 Instruments and Control Systems
- 329 Instruments and Experimental Techniques
- 330 International Journal of Air Pollution
- 331 IRE Trans. of Industrial Electronics
- 332 Iron and Steel (Eng)
- 333 ISA Journal

- 334 Italia
- 361 Japan Society Bulletin
- 362 Jet Propulsion
- 363 Journal of American Water Works Association
- 364 Journal of Applied Physics
- 365 Journal of Basic Engineering
- 366 Journal of Chemical Education
- 367 Journal of Chemical Physics
- 368 Journal of the Chemical Society
- 369 Journal of Colloid Science
- 370 Journal of Franklin Institute
- 371 Journal of Inst. Electronic Engineers
- 372 Journal of Industrial Fuel
- 373 Journal of Oil and Colour Chemists
- 374 Journal of Optical Society of America
- 375 Journal of Physical Radium
- 376 Journal of Physics Society of Japan
- 377 Journal of Royal Institute of Chemistry
- 378 Journal of Scientific Instruments
- 379 Journal of Scientific Instruments Supply
- 380 Journal of Technical Physics U.S.S.R.
- 381 Journal of Thoracic and Cardiovascular Surgery
- 382 Journal of Applied Chemistry

- 383 Journal of Chromatography
- 401 Kerntechik
- 402 Kolloid Zhur
- 403 Kagaku No Ryoiki
- 441 Laboratoire Mediterranee de Recherches Thermodynamiques (France)
- 442 Laboratory Science
- 443 Le Vide (in French)
- 481 Magyar Kemiai Folyoirat
- 482 Makromolecular Chemi
- 483 Manufacturing Chemist and Pharmaceutical and Fine Chemical Trade Journal
- 484 Metallurgia
- 521 National Engineer
- 522 National Nuclear Energy Service
- 523 National Symposium on Vacuum Technology
- 525 Nuclear Engineering
- 526 Nucleonics
- 527 Nuovo Cimento
- 528 National Bureau of Standards Circular
- 561 Oil and Gas Journal
- 562 Oyo Butsuri

- 601 Paper Trade Journal
- 602 Petroleum Engineering
- 603 Pharmazie
- 604 Philips Technical Review
- 605 Philosophical Magazine
- 606 Physica
- 607 Physica, 's Grav.
- 608 Physical Methods in Chemical Analysis
- 609 Physical Review
- 610 Physical Society of London Rep. Progress Physics
- 611 Physics Today
- 612 Power
- 613 Process of the Cambridge Philosophical Society
- 614 Process International Phoel. Congress
- 615. Process of the Pennsylvania Academy of Science
- 616 Proceedings of Physical Society
- 617 Product Engineering
- 618 Plaovo Gimento
- 619 Proceedings of Royal Society

- 681 Record of Chemical Progress
- 682 Refrigeration Engineering
- 683 Research Engineering
- 684 Review of Scientific Instruments

- 685 *Ricerca Scientifica*
- 686 *Revista Dei Combustibili*
- 687 *Review of Institute of French Petrole et Ann Combustible Liquids*

- 721 *Science*
- 722 *Siemens-Zeitschrift*
- 723 *Slaboproudy Obzor*
- 724 *Southern Power and Industry*
- 725 *Suddent Apoth. Ztg.*
- 726 *Suomen Kemistilehti*

- 761 *Termotecnia*
- 762 *Transaction American Society of Mechanical Engineering*
- 763 *Transactions Electrochemical Society*
- 764 *Transactions of the Faraday Society*
- 765 *Transactions of the Instrument Measure Conference (Stockholm)*

- 801 *U.S. Patent Department*
- 802 *Uspekhi Fiz Nauk*

- 841 *Vacuum*
- 842 *Vacuum Techniques*
- 843 *Vacuum Testing Handbook for Columbia Project*
- 844 *Vacuum - Technology (Brit)*

- 845 Vide
- 881 Water and Sewage Works
- 882 Water and Water Engineering
- 883 Welding Journal
- 884 Westinghouse Engineering
- 885 Wiadomosci Chemistry
- 886 World Oil
- 961 Zavodskala Laboratoriya
- 962 Zeitschrift Angewandte Physik
- 963 Zeitschrift fur Electrochemie
- 964 Zeitschrift fur Instrumentenkunde
- 965 Zeitschrift fur Naturforschung
- 966 Zeitschrift fur Physik
- 967 Zhurnal Tekhnicheskoi Fiziki
- 980 All Other Unlisted Sources
- 996 U.S.Colleges and Universities
- 997 U.S.Government Contract Reports
- 998 Symposiums and Conferences
- 999 Independent Publications (Private)

241-39-111

00010

Allen, R.B.

Gas Age 84:19-20 5 14, 1939

Abstract Eng. Index p. 781, 1939

"Gas Leak Detection Procedure"

Comments from abstract - Paper deals with investigation of leak detection methods used by the Michigan Consolidated Gas Co. Equipment and methods similar to those used in Denver, Pittsburgh, and Cleveland.

"Hot Wire" combustible detector was selected as best type for purpose.

323-48-111

00015

134

900

Apker, L.

Ind. Eng. Chem. 40, 846-7. (48)

Surface Phenomena Useful in Vacuum
Technique

Described are the uses of thermionic emission from wires, field emission from single crystals, and photoelec. emission from W to detect very low partial pressures of gases whose presence causes current variations. Although it is not as sensitive as the thermionic method, the photoelec. method is convenient because it can be used at low temps. and with very little accelerating voltage.

999-61-612

00020

Allport, J.J.
Wrenn, B.G.

AD-264 479 Div. 9, 27
(TIPSP/TL)

Dynamics of Two-Phase Flow in Rocket Nozzles

Theoretical and experimental investigation is conducted on the radial and axial velocity lag of a solid disperse phase in accelerating gases. The objective is to obtain basic data regarding the nozzle flow dynamics of a gas-particle mixture which results from the combustion of solid propellants containing metal additives.

684-53-133

00030

Alers, George A.
Jacobs, James A.
Maimberg, Philip R.

Rev. Sci. Instr. 24, 399-400 1953

Increased Sensitivity of Leak Detection with Hydrogen

From a plot of ion-gage reading vs. diffusion-pump-heater voltage with a given leak it is seen that for decreasing pumping speeds an ion gage is considerably more sensitive to H than to air. A plot is presented of the relative sensitivity vs. the diffusion-pump-heater voltage for the particular ion gage and diffusion pump used. The technique used to find leaks was to cover the questionable section with a nearly airtight bag into which H could be introduced after the air was pumped out. The meter reading increased almost instantaneously when the H was put at the leak.

093-59-159

00040

Aldebert, Franz

Chemiker Zig. 81, 569 (59)

Device for Quantative Gas Analysis

The test tube experiment for CO_2 and other gases can be easily falsified by splashes and CO_2 from the breath. An apparatus to avoid these complications is described.

684-51-510

00050

Alpert, D.
et. al.

Rev. Sci, Instru. 22, 370 (51)

Mechanical Diaphragm for Leak Detection

A manometer has been developed for the pressure measurement of very pure gases or condensable vapors. It can be outgassed at high temperatures, is rugged in construction and has maximum error of 10^{-2} mm Hg. (Abstract) This is a null-reading manometer.

364-54-900

00060

Alpert, D.
Buritz, R.S.

J. Appl. Phys. 25 202 (54)

Ultra-High Vacuum, II, Limiting Factors on the Attainment of Very Low Pressures

Deals with pressures -10^{-10} mm Hg.

845-57-152

00070

Amoignon, J.
Mongodin, G.

Vide, V.12, 371-6 (57)

Analysis of Residual Gases Remaining at Very Low Temperature

An ionic resonance spectrometer, virtually a miniature cyclotron constructed for the analysis of residual gases is described. Its resolution limit is mass 60. Details of its test on an Edwards pumping system and its calibration are given. During the first few hours of continuous pumping water vapour predominates in the residual vacuum and even after 20 hours the partial pressure of water vapour is still ten times that of carbon dioxide.

011-39-100

00080

Amon, A.
Puwein, B.

Austrian J. of Phys. 156, 921 (39)

A Fire and Dangerous-gas Alarm

616-57-900

00090

Anderson, J.M.

Proc. Phys. Soc. A, V.70 pt 12, 887-99 (57)

The Nature of Active Nitrogen

It is shown that the first bimolecular process found experimentally in the decay of the nitrogen afterglow requires oxygen as a catalyst and draws both active bodies from a common population. An activation energy of 900cm^{-1} is necessary for this afterglow process. The second bimolecular process involves two active bodies possessing monomolecular decays and drawn from different populations. Negligible activation energy is required for this afterglow process. This process is quenched by oxygen and required a minute impurity believed to be hydrogen. The final monomolecular decay shows the usual diffusion-collision pressure dependence at higher temperatures and effectively diffusion dependence only at lower temperatures. The effects of diffusion are much reduced by a monomolecular layer of oxygen on the walls. An aggregate possessing a dissociation energy of 5600cm^{-1} is involved in the final afterglow process. Reasons are given for believing that the first bimolecular process is recombination of nitrogen atoms in the presence of an oxygen molecular catalyst of the order of a few parts per million and that the second process is a collision of two different vibrationally excited ground states of the nitrogen molecule with a molecular hydrogen catalyst of the order of a few parts per million.

012-56-153

00100

Anderson, J.R.A.
Napier, K.H.

Australian J. Chem 9, 541-3 (56)

Vapor-phase Chromatography Separation of
Aromatics from Saturated and Olefinic Hydrocarbons

The use of $\text{CH}_2(\text{CH}_2\text{OH})_2$ (I) and polyethylene glycol cresyl ether (II) as the stationary phases (III) with 44-60 mesh Al_2O_3 as support for vapor-phase chromatographic separation of aromatics from saturated and olefinic hydrocarbons is described. It was indicated that the ether linkage and not the HO group is primarily responsible for the interaction with aromatics. C_6H_6 is easily separated from cyclohexane (IV) and cyclohexene of II and emerged later than the higher-boiling components. C_6H_6 and PhMe are easily separated on II at 130° but IV and methyleyclohexane did not separate. The earlier emergence of the saturated compounds may solve the problem of analysis of products where a number of different III cause interference.

801- -100

00101

Anthes, C.C.

U.S. Patent No. 2,779,666

Halide Detector

Improvements on halide torch detector

323-48-900

00103

Apker, L.R.

Industr. Engng. Chem 40, 846-7 (48)

Surface Phenomena Useful in Vacuum Technique

Studies of surface phenomena can give valuable information at pressures so low as to be unmeasurable by the usual methods. Previous work on thermionic emission from wires, and on field emission from single crystals, is mentioned briefly. The photoelectric emission from W is very sensitive to residual gas in vacuum systems and can be used to estimate partial pressures of active gases. A simpler method involving a sudden burst of absorbed gas into an ionization gauge is also described.

323-43-612

00104

Appleby, W.G.
Avery, W.H.

Industr. Engng. Chem. 15, 349-350 (43)

An Improved Meter for the Measurement of Gas Flow Rates

403-58-153

00105

Araki, S.
Mashiko, Y.

Kagaku no Ryoiki 12, 575-6 (58)

A Symposium on Gas Chromatography. Some Comments on the Gas Chromatography Apparatus in the Present Status

A listing of twelve papers presented at the Symposium is given.

323-45-153

00106

Askevold, R.J.
Agruss, M.S.

Industr. Engng. Chem. 17, 241 (45)

Analysis of the Light Constituents in Crude Petroleum by Low-Temperature Fractional Distillation

049-59-153

00107

Audran, R.
Reutenaur, G.

Bull. Soc. Chim France 46-51 (59)

Apparatus for Chromatography Permitting the
Concentration of Constituents

An app. is described for the concn, and sepn. of low-concn. constituents. The app. consists of a chamber in the shape of a cone which encloses a chromatographic circle. The circle folded in the shape of a cone, is placed in a circular trough contg. the material to be concd. or sepd. Within the cone is a small heater which serves to evap. the solvent from the upper portion of the chromatographic cone. Sepn. and concn. are thus effected by the differences in ascending R_f value and variation in the soly. of a constituent. The method has been applied to sep. methyl red, janus green, cyanine dyes, indigo carmine, proline, ornithine, and natural pigments of the chlorophyll type. It has also been applied to the sepn. of Rb and Cs. Electrophoretic methods are considered.

684-52-800

00110

Babelay, E.F.
Smith, L.A.

Rev. Sci. Instru. V 24 no. 7 508-10 (52)

Needle Valve Type of Variables Gas Leak for
Mass Spectrometers

How high vacuum needle valve may be used as adjustable leak for regulating flow rate of gas samples to mass spectrometer, when valve is equipped with wedge and lever system providing very sensitive control of needle position; flow through leak is molecular at spectrometer pressures, but mass flow may be secured by inserting capillary tube between sample and leak.

328-62-510

00120

Bach, C.R.

Instru. and Control Sys. 35 no. 2 121 (62)

Precision Mercurial Manometers

Short discussion of a mercury column reading to 0.01 mm Hg., to an accuracy of one part in 5000 (0.027)

328-62-151

00130

Bailey, C.W.
Howard, R.F.

Instru. and Control Sys. 35 no. 3 99-101 (62)

Mass Spectrometry Techniques

Elementary review of the operation of the various types of mass spectrometers

999-58-612

00140

Bailey, J.E.

Res. Rept. No. 16 Contract Nonr-978 (01) (58)
Mississippi State College

Correlation of Several Methods for Determining Skin
Friction in a Turbulent Flow

The values of skin friction that were determined by the pressure drop down the pipe. Cornish's method, Clauser's method, and the Preston tube showed good agreement for a turbulent pipe flow. It was found that the turbulent pipe flow profiles modified by suction were defined by the universal relation in the region very close to the wall if the value of U determined by Cornish's method was used. The values of skin friction determined by Cornish's method, Clauser's method, and the Preston tube for the turbulent boundary layer modified by suction were in agreement. The values of skin friction determined by the three methods based on the "Law of the Wall" were in agreement, among themselves, and the universal logarithmic relationship, using the value of U for the suction case, fell on the same curve as the pipe flow profiles in the region near the wall. This may be interpreted as evidence that the "Law of the Wall" is valid for the suction case.

330-59-144
153

00150

Baker, R.A.
Doerr, R.C.

Intern, J. Air Pollution 2, 142-58 (59)

Methods of Sampling and Storage of Air Containing
Vapors and Gases

The effect of various storage techniques and materials on known concns. of gases in air was studied. Gases used were single components and complex mixts. under both atm. and compression conditions. Storage was made in steel cylinders, plastic bags, and glass flasks at varying time intervals. Anal. methods used were infrared spectrometry and gas chromatography.

801-52-151

00160

Baker, W.R.

U.S. Patent No. 2, 591,998 (52)

Leak Detector

This gas-leak detector of the mass spectrometer type involves an electric circuit for periodically directing ions corresponding to the indicator gas onto the ion receiver and for amplifying the resulting periodic current, thereby providing a leak detector of great sensitivity.

684-60-151

00170

Balestrini, S.J.
White, F.A.

Rev. Sci. Instru. V31 no. 6 633-6 (60)

Workable Magnetic Shim to Correct Second-Order Aberration in Mass Spectrometer

Simple shim developed for second-order focusing in existing conventional mass spectrometer of magnet sector type; formula for its fabrication from sheet of thin magnetic material, and practical method for its alignment.

999-54-300

00180

Bancroft, L.C.

Contract AT(07-2)-1 (DP-41) (54)
DuPont de Nemours, E.I. and Co.

Beetle Leak Detectors

A simple multipoint heavy water leak detector system is described which can be built without machine shop work. The circuit is fail safe and can be functionally tested from the control panel.

321-38-900

00190

Banerji, S.K.

Indian J. Phys. 12, 409-46 (38)

Interchange of Electricity Between Solids,
Liquids, and Gases Through Mechanical Action

The separation of electrical charges in mechanical interactions such as occur for example when gas leaves a jet and impinges on a plate is considered. The total charge of the different media involved is unaffected but the distribution can show a wide range of variation depending on the substances and processes involved. The charge developed on a medium depends on the violence of the mechanical action. Only a part of the mechanical work is converted into electricity. The exchange of electricity occurring in such processes can be explained in terms of an electrical double layer. Several examples of such interchanges are examined.

368-59-153

00200

Barber, D.W.
Phillips, C.S.G.
Tusa, G.F.
Verdin, A.

J. Chem. Soc. 18-24 (59)

The Chromatography of Gases and Vapors

A series of retention times at 156° was detd. by gas-liquid chromatography using molten stearates of Mn, Co, Ni, Cu, and Zn as column liquids and Celite as the solid phase and 1:3 mixt. of N and H as a carrier gas. The efficiency of the metal stearates was compared with Apiezon L. With mesitylene as an internal standard the relative retention times are given for 36 org. compds. including primary, secondary, tertiary, and 2-methyl alcs. amines, cyclic and aliphatic ketones, and aliphatic and aromatic hydrocarbons. In each homologous series the log of the retention times plotted against the no. of C atoms gives a straight line. Amines are retarded most strongly, but accurate retention times are difficult to det. owing to asymmetric peaks. Retardation factors for secondary and tertiary amines with Mn, Co and Zn stearates were proportional to the basic dissocn. consts. of the basis with metal steroids there is a selectivity of special groups so the sepn. of some pairs of compounds is easier than can be obtained with Apiezon. Heats of soln as obtained on these columns, are given for the class compounds.

999-52-132

00210

Barnes, A.H.
Smith, A.
Wimunc, E.A.

Contract W-31-109-eng-38 (52)
Argonne Nat'l Lab.

Helium Leak Detector Test for Hanford and
Savannah River Fuel Slugs

A He pressurizing vessel is described which has been used for detecting the presence of minute holes, cracks, and fissures in the Al jackets of reactor fuel slugs which would allow moisture to penetrate to the U during reactor operation. Slugs may be tested in batches of ten, allowing examination of 200 slugs per hour with a single machine. Any batch which shows excessive He absorption and subsequent release, as measured with a He leak detector, is tested individually to locate the defective slug.

998-56-800

00220

Barry, W.H.
Hourlier, P.

Congr. groupe, avance, methodes anal.
spectrog. prod. met 19th Congr. 135-47 (56)

New Standard Quantometer (Model) 14000

The quantometer 14000 is a simplified version, with certain new features of the large research quantometer, suitable for control analysis, with voltage stability of the order of 0.02% and 0.2% reproducibility. It consists of a Multi-source Unit Model 6700; a new version of the horizontal 1.5-m A.R.L. grating spectrograph, whose scanning device permits automatic compensation for the effects of temp. variations; and a novel, simplified recorder console that (a) is adaptable to a wide range in concn. (1-1000); (b) can read only those elements desired; and in the order desired; and (c) can be used as a ratio recorder to read intensities as compared to an internal standard.

999-56-900

00230

Bartle, L.
Turner, A.F.

Bausch and Lomb Optical Co. (56)
Contract DA 44-009-Eng-2117

Studies of Semiconduction Films

This final report is in two parts, the second being a summary of all research and development carried out during the two years of the contract. The first part deals with work conducted in the eighth and final period on the preparation and testing of radiation thermocouples employing

vacuum evaporated films of semiconductors. With suitable preparation, these films yielded the high thermal emfs characteristic of the crystalline form of this class of materials. Ad 102317. Plates are black and white negatives.

999-57-114

00240

Barton, R.S.

Atomic Energy Res. Est. (Gt. Brit.)
GP/M-189 (57)

The 1441A Oxygen Leak Detector

An auxiliary power pack, designed for use in conjunction with the 1075 ionization gage control unit, has been developed for the purpose of rapidly converting an ionization gage, used in a vacuum system for pressure measurements, into a diode for leak detection using O_2 as the probe gas. Entrance of the gas into the vacuum envelope leads to a decay of electron emission from the hot cathode of the diode and this is observed on a meter suitably positioned in the gage circuit. A description is given of experiments made to obtain the information necessary for the design of the above mentioned pack followed by a brief description of the type finally built for stores issue.

999-56-510

00260

Bauer, R.C.

Aro, Inc. (56)

Method of Calculating the Response Time for Pressure Measuring Systems

In this report theoretical lag-time equations are developed for single- and double-tube pressure measuring systems connected to manometers or to measuring instruments of constant volume. Qualifying parameters which relate the applicability of the lag time equation to any particular pressure measuring systems to within 10 or 20 per cent. Equations are also presented for determining the optimum diameter of the second tube in a two-tube pressure measuring system and for estimating the effect a leak in the system would have on the measured pressures.

684-50-133

00270

Bayard, R.T.
Alpert, D.

Rev. Sci. Instrum. 21, 571 (50)

Extension of Low Pressure Range of the Ionization
Gauge

Redesigned ordinary ionization gauge to measure pressures down to 10^{-10} mm Hg by inverting the normal order of triode elements. Study of the effect of soft X-rays produced in a normal ionization gauge.

684-62-800

00280

Beams, J.W. et. al.

Rev. Sci. Instrum. 33, No. 2 151-5 (62)

Spinning Rotor Pressure Gauge

A magnetically suspended rotor pressure gauge is described for measuring pressures below 10^{-4} to rr.

327-51-510

00290

Bean, H.S.

Instruments V24, 528-9 (51)
Mathematics of Monometers

This is about correction factors for the balancing effect of a gas in one leg of a manometer.

801-57-113

00300

Beard, R.B.

U.S. 2,817,229 V725 no. 4 657 (57)

Apparatus for Measuring Constituent
Concentrations of Atmosphere

An electronic device using thermocouples to detect the concentration of gas in a heated gaseous atmosphere.

841-52-133

00310

Beck, A.H.
Brisbane, A.D.

Vacuum 2, 137-46 (52)

A Cylindrical Magnetron Ionization Gage

A new gage is described which reads pressures of 10^{-4} - 10^{-8} mm. Hg, produces 100 times as much current as an ordinary ionization gage and requires no emission-stabilization device. The gage is essentially a modification of the Penning gage with a central wire anode held at 6kv. pos. and a cylindrical cathode structure sepd. in boxed compartments by baffles. A calibration set-up is described, and curves are shown indicating the current in microamps v.s. anode voltage at const. field for different pressures. The gage is used in a leak detector employing butane or CO_2 as probe gas. Leak rates of 10^{-6} lusec can be detected.

841-54-133

00320

Beck, A.H.
King, G.

Vacuum 4, 147 (54)

A Sensitive Leak Detector Using Magnetron Ionization Gages

The construction of a differential leak detector capable of indicating leaks of 10^{-7} l u sec. is described. The detector uses 2 magnetron gages in a bridge circuit. The gage is modulated at 200 cts/sec and an a.c. amplifier is used as detector. The vacuum system comprises 2 Hg pumps connected to the gages through an Alpert all-metal vacuum tap. A freezing trap is placed between the gages which freezes out the probe gas squirted onto the leak and introduced in the first gage by a needle valve. The difference in butane content unbalances the bridge.

484-47-154

00330

Belcher, R.

Metallurgia 35, 310 (47)

Apparatus in Qualitative Microanalysis VI Apparatus for the Detection of Gases

For the detection of gases on a micro-seal liberated by addition of suitable reagents, 2 forms of apparatus are generally used. One is the Feigl-Krumholy apparatus and the other is the Feigl-Rossler apparatus. This paper describes a modification in the Feigl-Rossler apparatus to overcome a defect.

378-56-151

00340

Bell, R.L.

J. Sci. Instrum. V33 No. 7 269-72 (56)

The Omegatron as a Leak Detector

The omegatron, a radio-frequency mass spectrometer, has been applied to the detection of very small leaks using the helium probe technique. Although intrinsically of similar sensitivity to the conventional magnetic sector mass spectrometer, its effective sensitivity can be very much increased by reducing the speed at which the leak and leak detector combination is pumped, an operation which is not feasible with the usual mass spectrometer. By this means leaks of 10^{-11} l.mb/sec are readily found. The limiting sensitivity appears to lie in the 10^{-14} l.mb/sec region. A simple omegatron construction for the leak detection is described, and precautions to be taken in the use of helium mentioned.

004-62-153

00350

Bellar, T. et.al.

Analytical Chem. 37 No. 7 763 (62)

Direct Application of Gas Chromatography to Atmospheric Pollutants

The use of a flame ionization detector permits direct determination of hydrocarbons at concentrations found in the atmosphere. Prior concentration of samples in a cold trap is not necessary. With the system described, the investigators were able to detect the lower molecular weight hydrocarbons found in automotive emissions in controlled irradiation studies. Ease of operation, high sensitivity, and reproducibility are advantages of the technique. Concentrations as low as 0.001 p.p.m. may be detected in air samples. The experimental parameters required to obtain these results are evaluated. Instrumental modification required for several applications are discussed with emphasis upon development of a reliable system with which the hydrocarbons at atmospheric concentrations can be determined routinely.

980-41-145

00360

Benedicks, C.
Sederholm, P.

Ark. Mat. Astr. Fys. 27B, 4, No. 16 (41)

Detection of Leaks in Glass Vacuum Apparatus

A method is described for using an ordinary induction coil instead of a Tesla coil for detecting leaks, and the use of benzene instead of CO_2 or alcohol for surrounding a suspected leak is recommended.

528-53-151

00370

Bennett, W.H.

Nat'l. Bur. Standards Circ. No. 522 111-14 (53)

The Nonmagnetic Radio-Frequency Mass Spectrometer

A typical mass spectrum of air is given as detd. in a 3-stage nonmagnetic, radio-frequency mass spectrometer. This instrument, together with assocd. circuits, has been made in a version weighing less than 25 lb.

364-50-152

00380

Bennett, W.H.

J. Appl. Phys. 21, 143 (50)

Radiofrequency Mass Spectrometer

Uses velocity selection rather than magnetic beam deflection for gas analysis. Simpler, more compact, and more rugged than magnetic beam deflection devices.

043-39-154

00390

Berger, H.

Brit. 511, 923 (39)

Gas-Detecting Apparatus

The apparatus consists of a U-shaped tube with 2 vertical arms connected at their upper ends, a thermometric indicator, a catalyst and a valve controlling the connection between the 2 vertical arms to zeroize the reading of the indicator, one of the vertical arms forming the indicator, the catalyst surrounding the other arm and a throttle clop or a cock interrupting the connection between the upper ends of the 2 vertical arms. The catalyst may consist of a tubular piece with deposits of precious metals surrounded by quartz glass wool or asbestos with deposits of Pd, Pt, and other precious metals, and the whole may be surrounded on all sides by a granular catalyst with suitable deposits by which CO, which is detrimental to the inner catalyst is extd. from the gas-air mixture so that the whole catalyst has an unlimited life.

999-50-900

00400

Bertein, F.
Cherrier, C.
Verot, L.
Wagner, R.

C.R. acad Sci. Paris 230, 1866-7 (50)

Photo-Electric Apparatus for the Quantitative
Analysis of Coloured Gases

An apparatus is described consisting of a glass by-pass tube mounted on the main gas conduit, an incandescent bulb at one end of the tube and a photo-electric cell at the other end, the variation of the photo-electric current during the gas flow being amplified so as to operate an alarm relay. The apparatus has been adapted for (a) the determination and automatic recording of the content of Cl_2 or NO_2 in a gaseous mixture, (b) the determination of the humidity of a gas, and (c) the signalling of a quantity of one of the above gases, exceeding a previously fixed figure, having passed through the conduit with an immediate stopping of the gas circulation.

378-58-151

00410

Beynon, J.H.

J. Sci. Instrum. 35, 164-6 (58)

Mass Spectrometer

Double differentiation of the ion beam in a mass spectrometer is shown to have the same effect on peak shape as reduction to zero width of the inlet and exit slits. When this differentiation is performed by modulation of the accelerating voltage, increase of the modulating amplitude results in effective control of the width of both inlet and exit slits making the spectrometer more versatile since its sensitivity and resolving power are easily controlled. Differentiation by an odd number of times enables the center of a singlet peak to be located with greater speed and accuracy. Thus improving the mass measurements made with the spectrometer.

Two major advantages arise from the differentiation of a mass spectrometer being: an increase in the precision of mass measurements; and a simple control over the resolution of the instrument. This may be relevant to leak detection since, in the case of organic compounds, which need to be detected, the atomic composition of the ion could be found by a sufficiently accurate measurement of its mass. The advantages gained in differentiation the mass spectrum have been found by observing the discontinuities in the ion distribution introduced by the slit edges.

378-58-151

000420

Beynon, J. H.
Clough, S.

J. Sci. Instrum. 35, 289-91 (58)

Mass Spectrometer

The essence of this report deals with a method to measure accurately the magnetic field at a mass spectrometer. An instrument utilizing the galvanomagnetic effect in bismuth to measure the field strength of a mass spectrometer magnet has been devised. This determines the masses at the peaks, as they occur when the spectrum is scanned by the variation of the magnetic field at constant accelerating voltage. The bismuth coil is mounted between the pole pieces of the magnet and the instrument marks on the mass spectrum a of fifty mass calibration points at predetermined values of bismuth resistance and indirectly of the magnetic field. In the range 0 to 200 mass units the instruments accuracy is ± 0.05 mass unit and 0.025 above this.

The mass range is not too high in most cases and the hysteresis of the magnets (standard on most spectrometers) does not set in until mass is in the range of about 100 to 200. Any device using the bismuth would to be thermostated due to the large temperature coefficient of bismuth.

378-56-133
800

00430

Beynon, J. H.
Nicholson, G. R.

J. Sci. Instrum. V33 No. 10 376-80 (56)

A Radioactive Ionization Gauge and Its Application to the Measurement of Latent Heat of Vaporization

A radioactive ionization gauge useful in the range of pressures 10^{-5} to 10mm of mercury, and its application to the determination of the latent heat of vaporization or sublimation of organic compound having vapour pressures in the above range up to 200°C, are described. The instrument uses a 0.5mc sealed radium source for ionization of the vapour and an electrometer amplifier for measuring the ionization currents produced. Values for the latent heats of fourteen compounds are given.

764-58-153

00440

Beynon, J.H.
Clough, S.
Crooks, D.A.
Lester, G.R.

Trans. Faraday Soc., 54, 705-14 (58)

A Theory of the Gas-Liquid Chromatographic Process

It was assumed first that all solute mols, spent the same time in the vapor phase in their passage through the column. This was extended to a simple distribution of the time spent in the vapor phase, a parameter being introduced that can be taken as a figure of merit for the column. The retention time for any compd. forming a dil. ideal soln. was estd. from a few simple measurements of the material comprising the column and a knowledge of the satn. vapor pressure of the solute. Gas diffusion was taken into account and an expression for the height of the equiv. theoretical plate was derived. This was shown to have a simple relation to the mean gas velocity in the column, with a min. value for a certain optimum velocity.

247-46-100

00450

Bialous, A.J.
Hansen, C.A.

Gen. Elect. Rev. 49, 20-6 (46)

Applications of the Thermal Conductivity Gas Analyser

The equilibrium temperature of an electrically heated wire depends on the thermal conductivity of the surrounding gas, whose composition can be estimated if the resistance-temperature curve of the wire is known. Two identical cells, fitted with W filaments are connected in two arms of a Wheatstone bridge, the other two arms being manganin resistances. One cell is sealed and contains a gas of known properties, while the unknown gas is passed slowly through the other cell. The cells are fitted into a block of metal maintained at a constant temperature. An indicating or recording galvanometer is connected across the bridge and there is a milliammeter and variable resistance in the battery circuit. The out-of-balance deflection depends on the unknown constituents and is a direct indication of their ratios. This method is non-destructive, requires only a small sample, has a response time of 6 sec to 2 min. depending on the conditions, will give a continuous record and requires comparatively little attention. It is not suitable for detecting traces of one gas in another, or for systems or more than two gases, except under special circumstances. Typical applications are flue gas analysis: O_2 and CO_2 measurements in respiratory experiments: gas or vapour analysis and control in the chemical and electro-chemical industries: atmosphere analysis in heat processing plants: for the detection of "fire-damp": testing balloon fabric: food preservation, etc.

378-57-151

00460

Bierman, A.

Rev. Sci. Instrum. 28, 910-13 (57)

Resonance Mass Selector

This device can select ions or masses on the principle of their oscillating frequency in a static "potential well" where the ions pass several times across the same rf field tuned to their oscillation. The particles gain energy on each passage. The initial velocity of the particles is not of primary importance thus there may be more energy spread in the ion source. This is not so in most mass spectrometers. No high mechanical precision is required, also the resolving power may be varied by electrical means. In this idea, no magnetics are used.

246-45-100

00470

Biggs, N.B.

Gas World 122, 430-2 (45)

Detection of Gases in Air or in Other Gases

Tests which can be used by the gas engineer or chemists for detecting manufd. gas, CO, SO₂, CS₂, H₂S, C₆H₆, and toluene vapors, HCN, NO, and O in air or other gases are outlined.

443-46-133

00480

Biguenet, C.

Le Vide I, 174-6 (46)

Measurement of Very Low Pressures by the Ionization Gauge

Describes laboratory determinations of the characteristics of a number of ionization gauges of different design. The ion current was found to be proportional to the electronic current and to the ionizing distance, and the gauges were found to be most sensitive with grid at +250V and plate at -30V. The ideal gauge should have a larger electronic current than the usual 20mA, the distance between grid and plate should be as large as possible, and the grid should be so shaped as to have a large surface for cooling purposes, but to intercept as few electrons from the filament as possible.

327-51-510

00490

Biles, M. B.

Instruments V24, 159 (51)
High Pressure Differential Monometer

This discusses a high pressure differential manometer which permits visual observation of the liquid columns. It is an instrument constructed to facilitate accurate measurement of small pressure drops in fluid meters and hydraulic equipment operating under high flow pressures.

616-45-900

00500

Binnie, A.M.

Proc. Phys. Soc. 57, 390-402 (45)

A Double-Refraction Method of Detecting
Turbulence in Liquids

The doubly-refractive properties of a weak soln. of benzopurpurin were used in a study of the onset of turbulence when the liquid flowed through a long horizontal glass pipe. A beam of polarized light was arranged to traverse a diam. of the pipe remote from the ends; the nicols were set to give extinction when the liquid was stationary. The emergent light fell on a photocell, which was connected through an amplifier to a cathode-ray tube. With unidirectional flow, photographs of the trace on the screen showed a steady straight line when the velocity was small. Disturbances appeared at a Reynolds no., R , close to 1970, and complete turbulence was established when R reached 2900. With forced oscillating flow, the trace at low velocities was a sinusoidal curve, on which, at a critical Reynolds no., small superposed ripples were observed. Even when the motion was greatly increased, the intricate traces recurred perfectly, but this phase finally broke up into complete turbulence as soon as the amplitude of the surface movement in the bottles at the ends of the pipe reached a certain limit. Considerable difficulty was encountered in securing satisfactory compromise between the conflicting requirements of the various parts of the app. A wide pipe and a narrow beam of light were used so that the lens effect of the former was small. A 0.25% benzopurpurin soln. was found most suitable for the expts.

997-60-421
612

00510

Bjorgum, O.

Contract AF 61(052)(275) (60)

Some Considerations on Possible
Calculations Concerning Sub-Sonic
Shear-Flow Turbulence

The problems considered in this paper are (a) the theoretical determination of the mean velocity profile of a simple stationary turbulent shear flow and (b) the determination of the lowest critical Reynolds number for which such a turbulent flow is possible. The general case of three-dimensional fluctuations is considered.

526-60-200

00520

Black, W. E.
Kerwick, W.

Nucleonics 18, 106 (60)

Finding Piping Leaks With Sealed
Millicurie Floats

24 60

A radioactive source such as Na²⁴ or Co⁶⁰ is placed inside a metal float. The float is then introduced into the pipe system to be tested. The flow is shut off so that the only current results from the leak. The float then follows the current and a man with a survey meter follows the float. If the float slows down or stops it indicates a leak.

801-51-100

00530

Blanchard, A.

U. S. 2,553,233 (51)

Detector of Gas Concentration in Solid-
Liquid Dispersions, Such as Oil-Well Mud.

044-51-900

00540

Bleas, J.
Leck, J. H.

Brit. J. Applied Phys. 2, 227-3 (51)

Differential Methods of Leak Detection

Differential methods of detecting leaks in high-vacuum systems may attain a sensitivity 20 times greater than that of the corresponding single-gage method. The

general plan calls for two identical gages to be inserted in the same point of a vacuum line, one of the gages having a cold trap (or chem-absorber chamber) such that when the probe gas enters the vacuum through the leak, it produces a differential pressure change which can be detected by a suitable bridge arrangement joining the two gages. Systems which use ionization gages and Pirani gages are discussed.

378-51-100

00550

Bleas, J.
Leck, J. H.

J. Sci. Instrum. Suppl. No. 1 20-8 (51)

General Principles of Leak Detection

The techniques of leak detection are reviewed, special emphasis being placed on methods for obtaining high sensitivity with simple apparatus. A theoretical analysis of the gas flow problem is supplemented by experimental results obtained with a system using two diffusion pumps in cascade. The importance of using constrictions and correctly positioning the gauge is stressed, and the losses of sensitivity due to virtual leaks, leaks in series and by-pass methods are considered. The relative sensitivity of different leak detection methods are tabulated.

524-44-133

00560

Bleas, J.

Nature, Lond. 154, 20-1 (44)

Use of the Ionization Gauge on Systems Evacuated by Oil Diffusion Pumps

378-60-114

00570

Bloomer, R. N.
Brooks, W. C.

J. Sci. Instrum. 37, 306 (60)

Simple Detector for Small Leaks Using a Thoriated Tungsten Emitter With Oxygen as Probe Gas

The principle involved is that the thermionic emission of a thoriated tungsten filament changes in the presence of even a small amount of gases like oxygen.

378-53-111

00580

Bloomer, R.N.
Haine, M.E.

J. Of Sci. Instrum. 30, 385 (53)

Simple Method of Leak Finding Using a
Pirani Gauge

While the vacuum system is being continuously evacuated, ether or butane is applied liberally to any likely joint. If there is a leak, it will show up as a deflection on the Pirani gauge, which is due to a change of pressure in the system due to the introduction of the ether vapor through the leak.

202-58-150

00590

Blondel, A.

Fonderie No. 144 19-24 (58)

Microanalyzer for Small Gas Samples

A microanalyzer for gases permitting samples of 0.1-1cc is described which permits great speed and precision in measurement. Volumetric readings for the pressures of CO_2 , CO , H_2 , and N_2 are obtained. The techniques can be expanded for the measurements of volatile hydrocarbons, particularly CH_4 .

618-60-151

00600

Boato, G.
Sanna, R.
Vallauri, M.E.
Reinhart, M.

Plaova Gimento Supp. V16 No. 2 215-31 (60)

Uno Spettrometro di Massa di Elevata Sensibilita

High sensitivity mass spectrometer designed and put into operation at Physics Department of Univer. of Genoa; apparatus is suitable for measuring small variations of isotopic abundance ratio in light gaseous elements; sensitivity is one part in two million and precision is 1/1000.

604-46-111

00610

Boeke, J.

Philips Tech Rev. 8, 341-5 (46)

Electrical Detection of Traces of Poisonous
Gases in the Atmosphere

Finely divided Pt which catalyses an oxidation reaction is found to be hindered in this function by many gases which are also poisonous to the human body. Based on this fact, an instrument has been designed for detecting poisonous gases, e.g. CO and HCN. A Pt catalyst on a Pt wire serves as one of the resistance branches in a Wheatstone bridge and a mixture of CH_3OH and air is conducted along it. The heat developed by the oxidation of the alcohol keeps the Pt wire at 120-150°C. When the catalyst is poisoned the oxidation reaction ceases, the wire cools off and the bridge is unbalanced. A simple portable model is described.

481-59-143

00620

Bognar, J.

Magyar Kem Folyoiat 65, 223-7 (59)

Application of Ultraviolet Light in Analytical
Chemistry

Deals with chemical determination of ions in solution.

997-60-800

00630

Bohn, J.L.
Fuchs, O.P.
Morton, R.K.

Contract AF 19(604)3076 (60)

Spectrophotometric Determination of High
Temperatures

An effort was made to discover some method which would allow a direct measurement of the real temperatures of extremely hot bodies, or, failing that, to define a new substitute temperature which would be more universally applicable than present types, and which could be considered as a good approximation to real temperatures. Assuming that a body whose temperature is to be determined displays a continuous distribution of energy, two measuring procedures were developed which appear promising. The development of these two procedures resulted from a single objective: the radiometric measurement of the real (thermodynamic) temperatures of substances energized to upwards of a few thousand degrees Kelvin. The principle problem which had to be solved was how to minimize the influence of the unknown spectral emissivity. Each attempt to solve this problem in a different way.

The double-ratio method utilizes, in a double-ratio, the measured energy at three wavelengths in order to derive a temperature. In some respects it resembles the well-known method involving the ratio of energies at two wavelengths (single-ratio method). In the application of the single-ratio method, however, common practice is simply to ignore the existence of the unknown emissivity.

997-59-300

00640

Bolta, C.
Minushkin, B.
Steinmetz, H.
Sullivan, O.

Contract AT (30-3)-256 (59)

Design Development Tests of Some Components
for the 10MW_e SDR

A sodium leak from a fuel-coolant tube and a water leak from a calandria tube were deliberately induced to study the effect of these leaks on a barrier. A program directed at improving leak detection devices and developing better methods of leak detection is reported. Prototype fuel-coolant tube closure devices were experimentally evaluated at simulated reactor operating conditions to obtain useful design data. Devices to join the calandria tubes to the tube sheet while maintaining a gastight seal were experimentally evaluated.

997-59-145

00650

Bomelburg, H.J.
Herzog, J.
Weske, J.R.

Contract AF 49 (638) 385 (59)

The Electric Spark Method for Quantitative
Measurement in Flowing Gases

The operating principle of the techniques and the required instrumentation are described. Characteristics of spark discharges are analyzed theoretically and experimentally. A calibration is established for quantitative evaluation of spark photographs. Examples of application are given for subsonic, transonic, and supersonic flow and for investigations of turbomachines.

999-58-153

00660

Boreham, G.R.
Marhoff, F.A.

Gas Council Research Commun. GC54 28 (58)

Gas Chromatographic Analysis

Gas chromatographic analysis can be applied to manufd. gas, to refinery gas, to the examn. of condensates, and to the detn. of odorant concn. when it is added to the gas before its distribution. The effect of changing over from existing analytical techniques to accuracy, coupled with more rapid analysis. A more detailed knowledge of component compn. is also obtained.

604-55-133
510

00670

Bouwmeester, E.
Warmoltz, N.

Philips tech. Rev. V17 No. 4 121-5 (55)

A Simple and Reliable Ionization Manometer

An ionization manometer with four electrodes is described. The ionizing electron current is stabilized by means of a grid at constant potential placed near to the cathode and a high resistance in the cathode circuit. The ion current is measured with a Wheatstone bridge, two of whose branches consist of pentodes, the other two branches being resistors. The ion current passes through the control-grid circuit of one of the pentodes, thus unbalancing the bridge. A microammeter serves as the indicating instrument. Some measures for improving the accuracy at low pressures are discussed. The measuring range extends from about 10^{-2} mm Hg to approximately 10^{-6} mm Hg. The lower limit is restricted by the fact that under the influence of X-rays from the anode, electrons, are emitted from the collector.

845-60-800

00680

Bouyer, P.
Cassignol, C.
Lazeyras, P.

Vide V15 No. 88 297-300 (60)

All Metal Leak Valve

Adjustable all metal vacuum valve is described; performance tests indicate that control of very minute gas flows is possible; comparable valves are in present use at several installations of Centre d' Etudes Nucleaires.

524-50-151

00690

Boyd, R.L.F.

Nature, Lond. 165, 142-4 (50)

A Mass-Spectrometer Probe Method for the Study of Gas Discharges

Describes a new method for studying positive and negative ion populations in low pressures gaseous discharges. A probe, in which is incorporated a b.f. filter system, with a nose dia. 1cm. is moved radially through the discharge and enables radial variations of, e.g., negative ions to be studied. The system in effect is equivalent to a very small time-of-flight mass spectrometer of novel type.

616-55-151

00700

Boyd, R.L.F.
Morris, D.

Proc. Phys. Soc. A. 68, pt1 1-10 (55)

A Radio Frequency Probe for the Mass-Spectrometric Analysis of Ion Concentrations

Describes the development and analyses the action, of a versatile probe, which can readily be moved radially into and out of a discharge tube and which is able to distinguish between ions (positive and negative) of various masses. With this instrument it is therefore now possible to make probe studies on a particular species of ion in the presence of others. Basically the instrument is a very small 12-stage linear accelerator which discriminates in favour of ions of a particular mass-charge ratio passing through it sampling orifice. It is of high sampling efficiency and this together with its mobility and the absence of a magnetic field gives it certain pronounced advantages over the magnetic method of analysis.

997-61-900

00710

Boyd, W.K.

Contract AF 33(616)7747) (61)

Summary of Present Information on Impact Sensitivity of Titanium When Exposed to Various Oxidizers

This review summarized the present status of the compatibility of titanium with LOX and with other oxidizers such as N_2O_4 , F_2 , and ClF_3 . Considerable experimental evidence has been obtained which indicates that, under certain conditions of impact, titanium and its alloys may ignite in strong oxidizers of the type used in rocket and missile propulsion systems. However, only in the case of LOX does there appear to be danger that the reaction will propagate and completely consume the titanium. In most cases, even though ignition occurs, the damage is not significantly greater than that occurring as a result of the impact alone. The data also suggest that the chance for a reaction can be minimized if the titanium surface in

contact with the oxidizer is smooth and surgically clean. In spite of its impact sensitivity, titanium appears to have some areas of application where it can be used in contact with strong oxidizers.

684-57-800

00720

Brackett, F.S.
Daniel, J.H.
Crickard, R.G.

Rev. Sci. Instrum. V28 No. 3 181-6 (57)

Recording Oxygen Concentration and Rate of Exchange

A recorder for oxygen concentration and rate of exchange is described. A polarographic square-wave method is adapted to serve pen-recording. Cam-driven microswitches provide the square potential pattern and also the programmed timing on which the rate evaluation is based. A three-second time resolution in rate reveals transient details unobserved in concentration recording.

561-64-421

00730

Bozeman, H.C.

Oil and Gas J. V126 (64)

Sonic Method Pinpoints Pipeline Leaks

A sonic leak detector is used to locate pipeline leaks in a hydrostatic system. Some results are given.

378-54-112

00750

Bradley, R.S.

J. Sci. Instrum. 31, 129-30 (54)

A Thermistor McLeod Gauge for a Pressure
Range $1-10^{-7}$ mm of Mercury

A gauge capable of reading pressures of non-condensable gases in the range of $1-10^{-7}$ mm Hg has been made by sealing a thermistor bead into the end of the closed capillary of a McLeod gauge, the thermistor acting as a thermal conductivity manometer of the Pirani type.

124-57-153

00760

Brenner, N.

Drug and Cosmetic Ind. 80, 166-7, 261-6 (57)

Gas Chromatography

Applications for the chemist are discussed.

999-48-305
621
632

00765

Brightman, J.B.
Chace, E.G.

Refrig. Eng. 55, 553-5, 606 (48)

Leak Detection on the Refrigerator Production Line

The use of the halogen leak detector and the mass spectrometer gas analyzer are discussed in connection with detg. leaks in refrigerating lines. The halogen detector is based on the fact that compounds of the halogen family are decomposed on contact with a hot platinum filament. By use of the halogen leak detector, leakage of 0.004 oz of Freon 12 can be detected. In testing refrigerating systems by use of the mass spectrometer, He is usually introduced into the system to be tested, and the gas analyzed for is accordingly He.

801-50-154

00770

Brinker, Wm.E.
Williams, V.C.

U.S. 2,517,382 (50)

Method for Detecting Acid Anhydride-forming Gases, Such as Carbon Monoxide and Gaseous Acid Anhydrides

A method for the detecting of small quantities of CO in air is given. The air, contg. CO is drawn through a water bubbler, is forced through soda lime to remove all constituents except CO, O, N, and possibly H, and then is divided into two channels. In one channel the CO is left intact, and in the other channel the combustion of the CO is caused by a heated Pt wire. The gas from each channel is forced into sep. compartments of a cell contg. H₂O or a salt soln. This cell contains a pervious wall between the compartments and a Pt electrode in each compartment. If the H-ion concn. in one compartment exceeds that of the other, a potential difference exists, which indicates the presence of CO in the original air. This potential difference is amplified by a vacuum tube voltage amplifier connected to a meter calibrated to indicate the percentage of CO in the air. Detection of 1-10 parts of CO per billion of air is possible.

097-56-153

00780

Brooks, V.T.
Collins, G.A.

Chem. and Industry 921, (56)

Gas-Liquid Chromatograph; Separation of Hydrocarbons
Using Various Stationary Phases

A suitable selection of a fixed phase permits a column to be used as a thermal distn. unit or a chromatographic one. Sepns. are made according to mol. types. A nonpolar material will not sep. hydrocarbons of about the same b.p., but there is good sepn. within a homologous series. As the polarity of the selected fixed phase is increased, aromatic hydrocarbons are held back relative to the aliphatic. This method could be used to eliminate the usual resolution by liquid-elution chromatography on SiO_2 gel before examn. by gas-liquid chromatography.

378-39-800

00790

Brookes-Smith, C.H.W.
Colls, J.A.

J. Sci. Instrum. 16, 361-6 (39)

Measurement of Pressure, Movement, Acceleration,
etc. by Electrostatic Systems

As pick up element serves as a small condenser, one plate being a diaphragm integral with the tubular element body. By careful design a linear characteristic and elimination of falsifying adjustment, and adaptation to various measurements such as indicated in title. For translating the capacity changes into potential variations, recorded by the oscillograph, a D.C. polarization circuit can be employed. Dependency on time constant, however, excludes application to slow processes. Using an h.f. resonance circuit, carrier frequency about 1Mc./s., the capacity changes can be balanced by a calibrated condenser. This null method, independent of circuit constants, renders static calibration possible. Useful range from 0 to 50 kc./s.

318-47-110
800

00800

Brown, A.F.
Kronberger, H.

J.Sci. Instrum. 24, 151-4 (47)

A Sensitive Recording Calorimetric Mass Flowmeter

The temperature distribution along a tube heated at its mid point is disturbed by the passage of gas, and electrical bridge arrangements enable a flow of 5 $\mu\text{g}/\text{sec}$ of H to give full-scale deflection of a 60 μA recorder. The instrument is linear to 20, this value, is independent of pressure and, within limits of temperature. Only the tube comes into contact with the gas.

684-41-151

00810

Brown, H.
Mitchell, J.J.
Fowler, R.D.

Rev. Sci. Instrum. 12, 435-41 (41)

The Construction of a Mass Spectrometer for
Isotope Analysis

997-59-153

00820

Browning, L.
Watts, J.O.

U.S. Gov't Research Rept. 31, 134 (59)
PB Rept. 151, 008, (59)

Design and Construction of a Gas-Liquid Partition
Chromatographic Unit, and its Application to the
Quantitative Analysis of Liquid Solutions.

A gas-liquid partition chromatographic unit has been designed and installed in a com.-type relay rack. A specially constructed control panel, sample-injection system, and thermal cond. cell facilitate modification of the unit for new applications.

684-46-133
720

00830

Brubaker, W.M.
Wouk, V.

Rev. Sci. Instrum. 17, 97-8 (46)

Frequency Modulated Oscillator for Leak Hunting

A circuit for converting a variable D.C. voltage signal into a frequency modulation of an audio-oscillation is described. The circuit can be used for general monitoring purposes, but this article confines the description to its use in conjunction with an ionization gauge for leak hunting in vacuum systems. The oscillator enables one operator to hunt leaks more rapidly and effectively than two men calling out meter readings. Leaks representing pressure rises of less than 4×10^{-3} mm of Hg have been found with an ionization gauge and this oscillator.

997-60-800

00840

Brusch, D.W.
Lawson, A.E.

Contract AF 33 (616)6601 (60)

High Temperature Thermistors

Chromic oxide is an adequate base material to be used in the manufacture of thermistors to be operated to 600°C. Despite the fact that the surface of these thermistors chemisorbs O, H, and water vapor, thereby changing unit resistance, a suitable coating material will be found which will minimize this surface effect. Contaminating oxides can be added to the basic Cr2O3 to change the resistance ranges which can be achieved. It is possible, using this technique, to extend the useful operating range of these thermistors beyond 600°C. An adequate but extremely slow and tedious method of attaching leads to disks and rods has been developed. Temperature deviation of the test chamber has been held to within 0.01 C thereby allowing a very accurate measurement.

379-59-800

00850

Brymner, R.
Stackelmecher, W.

J. Sci. Instru. 36, 278 (59)

Demountable Vacuum Seal for Operation at Temperatures from -188°C to 800°C

A new type of metal gasket vacuum seal which depends on a surface-friction effect instead of compression.

997-61-144

00860

Burch, D.E.
Gryvnak, D.
Williams, D.

Contract AF 19(604) 2633 No. 2 (61)

Infrared Adsorption by Carbon Dioxide

The infrared absorption of carbon dioxide was investigated. Samples consisting of carbon dioxide alone, and in binary mixtures with nitrogen, were investigated over wide ranges of absorber concentration w and total pressure P . From the absorption by each band or spectral interval, it was possible to determine either the total absorption in the mean fractional absorption for each sample. Curves are presented which show the total absorption of the CO₂ bands at 1/3716, 1/3609, 1/2350, 1/064, and 1/961 cm for various values of absorber concentration as a function of equivalent pressure $P_{sub e}$, which is a parameter that includes the total pressure P and a small additional term proportional to the partial pressure of the absorbing gas. Absorption curves for the

1/1064 and 1/961 cm bands as well as for the 1/875 to 1/495 cm region, were obtained for different samples of CO₂ at temperatures from ambient to approximately 70°C. For the temperature range covered it is possible to predict the increase in total absorption of the 1/1064 and 1/961 cm bands by use of an elementary function which is based on the calculated increase in population of the lower energy level giving rise to absorption.

327-50-151

00870

Burmester, K.E.
Evans, E.C.

Instruments V23, 242-5 (50)

Mass Spectrometer

003-56-200

00880

Brunett, T.J.
Hatch, T.F.

Am. Ind. Hyg. Assoc. Quart. 17, 80-4 (56)

Estimating Airborne Radioactive Particulate Hazards-
A Review of Sampling Criteria

Methods for sampling airborne radioactivity in air are reviewed and evaluated.

086-47-151

00890

Burroughs, J.E.

Chem. Eng. 54 No. 4 112-14 (47)

Detecting Leaks

Essential elements and basic procedure of mass spectrometer leak detector as used in chemical plant equipment; examples of varied applications are discussed.

378-43-800

00900

Burrows, G.

J. Sci. Instrum. 20. 21-8 Feb, 77-8 May (43)

Notes on High-Vacuum Technique

Deals with pumps, vacuum pipe lines, detachable joints and jointing media, vacuum gauges and indicators, and avoidance and detection of leaks.

687-56-153

00910

Buzon, I.J.
Moghadame, P.E.

Rev. Inst. France Petrole et Ann
Combustible Liquids 11, 1616 (56)

Vapor-Phase Partition Chromatography

Tests were made to evaluate the column const. retention, vol., and accuracy of sepn. of various mixt. Details of the construction of a vapor-phase chromatographic app. are described. Examples of the results are given.

684-54-800

00920

Caldecourt, V.J.
Adler, S.E.

Rev. Sci. Instrum. 25, 953 (54)

A Mass Indicator Using a Vibrating Coil Magnetometer

Describes a device to give continuous indication of magnetic field strength.

524-47-150

00930

Callisen, F.I.

Nature, London 159, 167 (47)

An Optical-Acoustic Method of Gas Analysis

Vengerov's method is not new; the "Uras" apparatus, in use for the last 10 years, is described.

525-57-200

00940

Cameron, J.F.
Jefferson, S.

Nuclear Eng. 2, 408 (57)

Method and Apparatus for Detecting Leaks in Pipeline

A radioactive solution is injected into fluid flowing in the pipeline behind which a first squee-gee go-devil is introduced, after an interval sufficient to enable the non-radioactive solution to flush the inside of the line clear of radioactivity a second squee-gee go-devil is introduced with a radioactivity recording detector. This detector is recovered at a remote point and the record of any activity is then transcribed in terms of distance along the line. To check the distance, the record may be marked at intervals by arranging sources of radioactivity at certain points along the line which will make a characteristic signal. For penetrating thick metal pipe gamma radioactivity is necessary and detectors with Geiger counters or scintillation detectors.

241-51-100

00950

Campbell E. C.

Gas Age V108 No. 13 26-8, 56-9 (51)

Why Planned Program of Leak Detection Pays
Continuing Dividends

Use of electrical and mechanical devices for locating source of reported gas leak; experience of Peoples Gas Light and Coke Co., Chicago, Ill; characteristics of combustible gas detector and leak detector; leak detection by means of vegetation surveys, manhole surveys, borehole surveys and public building surveys; savings in gas realized.

201-51-800

00960

Canal, F.

Farm Sci. e tec 6, 573-87 (51)

Experiments in Semimicro and Microelementary
Analysis

The detns. of C, H, and N by the Dumas method and halogen, S, and P by Carius' method, are described.

980-54-132

00965

154

Canavate, J.H.

Inform quim anal. (Madrid) 6 No. 1, 1-10 (54)

New Argentometric Procedures for the Determination
of Halides

The resistance to acids of oxidation-reduction absorption indicators in argentometric titrations was studied.

051-58-153

00970

Canuti, A.

Boll. lab. chim. Provinciali 9, 414-24 (58)

Method for Identification of Colored Substances
by Paper Chromatography

Standard chemical methods for the determination of an unknown.

001-54-153

00980

Carleson, G.

Acta. Chem. Scand. 8, No. 9 1693-6 (54)

The Separation of Small Amounts of
Inorganic Cations by Chromatographic Methods

The construction of a sensitive and well resolving scanning of chromatograms is described, permitting the determination of R_f values for as little as $5 \cdot 10^{-7}$ mo Co^{60} .

997-56-800

00990

Carroll, P. E.
Cohen, J.
Florio, J. V.

Contract AF 19(604)-1734 (56) 1st quat.

Heater-Cathode Leakage Investigation

The purpose of the present experimental program is three-fold: 1. To obtain a phenomenological description of heater-cathode leakage under typical life test conditions of military tube types. 2. To determine the nature and relative importance of mechanisms responsible for heater-cathode leakage and to investigate the physical and chemical parameters governing the important heater-cathode leakage mechanisms. 3. To utilize the experimental findings through specific recommendations concerning (a) the use of improved materials, (b) the use of improved processing and aging, and (c) the use of operating conditions conducive to the detrimental effects of heater-cathode leakage.

997-56-800

01000

Carroll, P. E.
Cohen, J.
Cutler, P.
Florio, J. V.

Contract AF 19(604)-1734 (56) 2nd Quart.

Heater-Cathode Leakage Investigations

The purpose of the present experimental program is three-fold: 1. To obtain a phenomenological description of heater-cathode leakage under typical life test conditions of military tube types. 2. To determine the nature and relative importance of mechanisms responsible for heater-cathode leakage and to investigate the physical and chemical parameters governing the important heater-cathode leakage mechanisms. 3. To utilize the experimental findings through specific recommendations concerning (a) the use of improved materials, (b) the use of improved processing and aging, and (c) the use of operating conditions to minimize the detrimental effects of heater-cathode leakage.

615-59-153

01010

Casey, P. S.

Proc. Penna. Acad. Sci. 33, 97-101 (59)

Construction of a Gas Chromatographic Apparatus

The app. consists of a const. temp. bath, a control panel, and a com. recorder. The control panel contains a pressure regulator for He, a pressure gruge, dry cells, a rheostat, a voltmeter, and a Helipot. The const. temp. bath contains the detector cell block, the chromatographic column, a heater, a stirrer, and a thermometer. The chromatographic column is made of Cu tubing (0.25 in outer diam.) packed with 35-80 mesh fire-brick. impregnated with diisodecyl phthalate.

845-53-151

01020

Cassignol, C.
Geller, R.
Moreau, J.

Vide 8, 1415-21 (53)

A Mass Spectrometer for Leak Detection

A brief description, with photographs of a mass spectrometer leak detector with a double monochromator and a novel high efficiency ion-source, giving a high signal-noise ratio. The monochromator uses the construction due to Cartan. No figures are given for the performance.

320-60-151

01030

Caswell, H. L.

IBM J. Res. and Develop. V4 No. 2 130-42 (60)

Analysis of Residual Gases in Several Types of High-Vacuum Evaporators

Mass spectrometer study of vacuum chamber in various film evaporator systems ranging from oil-diffusion pumped type to oil-free ultra-high vacuum chamber; use of special gasket materials, liquid nitrogen trap, titanium and nickel-iron getters to eliminate various residual gases and vapors.

104-43-143

01040

Catlin, F.

Chem. Met. Eng. 50, 116 (43)

Fluorescent Method Detects Leaks in Process Vessels

Leaks are detected by coating the surface of the vessel with a fluorescent penetrant and inspecting the opposite surface with a near-ultraviolet lamp.

041-50-900

01050

Cecil, R.

Biochem. J. 47, 572-84 (50)

Quantitative Reaction of Thiols and Disulfides with Silver Nitrate

It has been found from potentiometric titrations that reduced glutathione reacts with 1 equiv. of AgNO_3 to form Ag-mercaptide and, with a second equiv. to form a soluble complex. An excess of AgNO_3 was added to a soln. of GSH and the free Ag was back-titrated with KBr. The titration was made potentiometrically and the end point was reproducible to 10^{-8} g. equiv. By this procedure thiols can be detd. in the presence of disulfides but the soln. must first be acidified to pH 2.0 with HNO_3 . Cystine and oxidized glutathione were detd. by reduction with Na_2SO_3 under specific conditions and measuring the thiol formed. The hydrolytic reaction of cystine in the presence of AgNO_3 is catalyzed by acetate and completely inhibited by barbitone; the reaction of G_2S_2 is less affected by acetate and is only slightly inhibited by baritone; while in the presence of GSH and G_2S_2 cystine behaves like G_2S_2 .

980-52-150

01060

Ceupeil

Ateliers de fabrications pyrometriques
AfpYRO Fr. 1,025,227 (52)

Gas Analyzer

The app. consists of an upper (1) and a lower (11) container connected to each other by an at least partially transparent, graduated tube (111). The 1 is filled with the gas to be analyzed and the 11 is filled to a level visible in the 111 with the absorbing soln. The app. is turned over several times, where upon the gas bubbles through the absorbing soln. The initial pressure, indicated by a gage connected with the 1, is reestablished by decreasing the vol. of the 11, e.g. by pressing a rubber membrane in the wall of the 11, and the vol. reduction is read on the scale of the 111.

997-54-112

01070

Chapin, W. E.
Perry, P. G.

Contract DA-36-039-sc-63136 (54)

Component Evaluation and Specification
Engineering; Task XI

This assignment was confined to an investigation of the electrical performance of rod, disk, and bead thermistors as affected by low-temperature storage, moisture resistance, temperature cycling, shelf life, and continuous-load life. The program also included an investigation of temperature hysteresis and steady-state current-time characteristics, of galvanic action, of terminal and body strength, and of the effects of soldering to the terminals. Temperature elements were measured for initial resistance at 0 C, 25 C, and 50C, in order to establish a basis for comparing subsequent changes due to various investigations included in the program. These initial-resistance measurements were used to calculate material constants, which would reflect the changes that occurred during the scheduled investigations to temperature cycling, moisture-resistance cycling, shelf life, load life, and cold-storage exposures. In addition to the above investigations the temperature hysteresis and steady-state current-time characteristics were developed and the galvanic effects of moisture exposure determined. The physical properties explored were the terminal and body strengths and the effects of vibration, soldering, and terminal twist.

997-56-600

01080

Chapman, D.R.

NACA Rept. 1259

Some Possibilities of Using Gas Mixtures
Other Than Air in Aerodynamic Research

Gases-Use in wind tunnels. Flow-Compressible-Measurement. Gases-Viscosity.
Gases-Thermodynamic properties.

845-58-151

01090

Charles, D.
Warnecke, R.J.

Vide 12, No. 73 25-45 (58)

An Omegatron Leak Detector

A detailed description is given of an omegatron leak detector. Using Ar as tracer in dynamic operation, leaks of the order of 10^{-4} mm³/hr can be rapidly detected, and it is possible to detect very small leaks of the order of 10^{-6} mm³/hr by accumulation.

523-56-151

01100

Charpentier, D.E.

Natl. Symposium Vacuum Technol. 114-8 (56)

Simplified Mass-Spectrometer-Type Helium Leak Detector

The instrument detects leaks of 10^{-8} atm. cc./sec. and is housed in a cabinet only 19 x 22 x 20 in. Operating with 6 vacuum tubes and no cold trap, the design uses good vacuum geometry and simplified electronic circuitry. It is applicable to vacuum testing or air probe testing. The unit has also been used as a lab. vacuum system to evacuate small vessels for doing metal evapn. work and for making small exptl. gas discharge tubes.

999-57-900

01110

Chaun, R.L.

U. of Southern Calif. (57) AF 18(603)-95

Study of the Condensation of Nitrogen Below the Triple Point

An analysis is made of the rate of deposition of solid nitrogen on a cooling surface, in order to obtain design criteria for the condensing chamber of the two-phase wind-tunnel. It is found that the solution of the integral equation characterizing the process is possible through the use of experimental data obtained from a study made at the A.D. Little Laboratory.

945-58-151

01120

Choumoff, S.

Vide 8 V13, 193-6 (1958)

On the Sensitivity of Leak Detectors of the
Helium Mass Spectrometer Type

The author reports some leak detection measurements in the region 10^{-8} lusec., i.e., three orders smaller than that of the normal calibrated leak. It is suggested that the extrapolation procedure commonly used with the latter is invalid and leads to a pessimistic limit for the helium leak detector.

050-59-900

01130

Chung, N.T.

Bull. Soc. Sci. Bretagne 34, 27-32 (59)

Luminescence Spectra of Cadmium Iodide, of Lead
Iodide and of the First Salt Activated by the Second

Mainly a review, with possible new interpretations, The luminescence of the 2 salts and their mixts. varies with the form in which they are prepd., but theoretical explanations of the differences are still incomplete.

997-60-900

01140

Cobb, L.L.

Rept. on Contract DA 04-200-ORD-776 (60)

The Influence of Hydrogen Recombination on Turbulent
Flow Heat Transfer to a Flat Plate

A previous study of the heating characteristics of an oxygen-acetylene flame apparatus for surface ablation studies showed a large difference between measured heating rates and those predicted by convection heat transfer theory. Since atomic hydrogen was present in the flame, it was postulated that the exothermic recombination of these atoms was responsible for the increased energy transfer. The present investigation was undertaken to study this possibility. A discussion of convection heat transfer in dissociated gas systems is presented. Experimental measurements were made to verify the magnitude of the total heat flux and to establish the recombination mechanism. The experimental measurements verified the flux magnitudes predicted by the theory; volume recombination was established as the process responsible for the recombination reaction.

364-46-144

01150

Coggeshall, N.D.
Saier, E.L.

J. Appl. Phys. 17, 450-6 (46)

Analyses of Mixtures of Light Gases by Infra-red Absorption

A discussion is given of the application of infra-red absorption methods of analysis for light gases which do not obey Beer's law of absorption due to pressure broadening. The method depends upon the nature and intensity of the pressure broadening effect of the different components in the sample upon each other. Data are presented showing the nature of some of these effects and illustrating the accuracy obtainable for certain types of analyses. The instrumentation used in routine gas analyses by infra-red is described.

102-46-151
200
900

01160

Coggeshall, N.D.
Hipple, J.A.

Colloid Chem 6, 98-1-7 (46)

The Mass Spectrometer and Its Applications

The subjects discussed are: construction and operation, research and analytical operations, isotopic enrichment by natural processes, enriched isotopes as tracers, study of chemical reactions, disocn. of mols. by electron impact, analysis of mixts., application to photochemistry, reversal of ionic charge. Operating parameter of the instrument are under close control.

684-43-151

01170

Coggeshall, N.D.
Jordan, E.B.

Rev. Sci. Instrum. 14, 125-9 (43)

An Experimental Mass Spectrometer

Details of the construction and assembly of an exptl. mass spectrometer are given. The hull of the instrument was constructed entirely of metal. Accurate construction and alignment of source parts was due to their construction of machinable parts. The pos. ion collimating system consisted of 5 slits. The source filament collimating slits, condenser plates, and electron trap were all mounted on a machined block of AlSi Mag. Formation of ghost lines was prevented by the use of a long, narrow, electron trap. The ion-beam currents were measured by the Pennick balanced-bridge circuit by use of a Western Electric D-96475 electrometer tube.

164-58-151
700

01180

Collins, J.
Gillette, R.W.

Elec. World. 150, 94 (58)

Spectrometer, Helium Spot Cable Leaks

Consolidated Edison has applied the Helium Mass Spectrometer to the detection of leaks in gas filled cables.

378-62-700
800

01190

Collins, K.E.
Steele, D.J.

J. Sci. Instrum. 39, No. 3 115-8 (62)

Tortion Vane Flowmeter for the Continuous Recording of Air Flow

The instrument operates as a force balance system in which the torque caused by the flow of air past a four-bladed vane assembly is opposed by an equal torque produced by the flow of current in a coil attached to the cane and suspended in a permanent magnetic field. These opposing forces remain in equilibrium until a variation in air flow takes place, when the vane assembly which is not restrained, begins to turn. A mirror attached to this assembly and which rotates with it, causes the image of an illuminated slit to move across a photocell which in turn, controls the amount of the current flowing in the coil, so as to oppose its rotation until the two torques are again equal. This current is proportional to the square of the air flow and is used to provide the calibrated output, for application to the recorded.

684-62-500

01200

Condell, W.J.

Rev. Sci. Instrum 33 No. 2 231-5 (62)

Bakeable Absolute Pressure Gauge for the Millimeter of Mercury Range

A bakeable absolute pressure gauge which uses the compression of a gas in a precision bore glass tube by a piston of known weight is described. The measurement of the compression is accomplished by means of an electronic timing circuit. Equations are given for the design of the gauge and its accuracy under various operating conditions. Comparison is made between pressures measured by the gauge and pressures measured by liquid manometers.

841-54-133

01210

Conn, G.K.T.
Daglish, H.N.

Vacuum 3, 24-34 (54)

Cold Cathode Ionization Gauge for the Measurement of Low Pressures

Cold cathode ionization gauges in which the discharge is maintained in an axial magnetic field provide a convenient and rapid means of measuring pressure in the range 10^{-2} to 10^{-7} mm Hg. These instruments are simple to make and operate and it is virtually impossible to damage them. With such a gauge, measurement of pressure is effected by a robust pivotmeter which measures a current of ions formed by electron bombardment. Primary electrons are released by cold emission from a pair of cathodes and many secondary electrons are generated by the ions themselves. The magnetic field causes the electrons to move in tight spirals to and from between the two electrodes, between initial emission and eventual escape. A review is given of the construction, characteristic and performance of various types of cold cathode gauge. The influence is reported of size and shape of the electrodes, of applied voltage, of magnetic field and of the nature of the gas. Reference is made to the performance at relatively high pressures. Attention is drawn to the generation of radio frequencies by cold cathode gauges.

378-54-113

01220

Conn, G.K.T.
Daglish, H.N.

J. Sci. Instrum. 31, 95-6 (54)

A Simple Thermionic Vacuum Gauge

A description is given of a gauge which, because on the form of the anode, is very easy to construct. The release of photoelectrons which limits the use of a conventional thermionic gauge at low pressures is surmounted by using a single wire as the ion collector. At pressures of the order of 10^{-4} mm Hg or less the instrument is linear and has a sensitivity of about $13 \mu\text{A}$ per μ pressure per mA anode current.

378-54-113
140

01230

Conn, G.K.T.
Daglish, H.N.

J. Sci. Instrum. 31, No. 11 412-16 (54)

A Thermionic Ionization Gauge of High Sensitivity Employing a Magnetic Field

An arrangement consisting of a cylindrical anode, an axial thermionic filament and an axial magnetic field provides a high electron density if the magnetic field is sufficient to prevent most of the electrons from reaching the anode. End plates, perpendicular to the axis and maintained at a negative potential relative to the filament, serve the double purpose of preventing the escape of electrons and collecting ions if gas is present. Such an arrangement forms a simple vacuum gauge the sensitivity of which may be at least 100 times that of the conventional thermionic gauge; for normal use robust pivoted meters may be used in place of galvanometers or d.c. amplifiers. The ion current is linear with pressure below 10^{-4} mm of Hg. Characteristic curves are presented and the action of the instrument is interpreted in terms of these.

997-60-800

01240

Connes, P.

Contract AD-258 482 (60)

Interference Spectrometer with AM Selection

A new spectrometric method, chiefly useful in the infrared is described. By replacing the mirrors of a Michelson interferometer with 2 gratings under equal incidence and by making the path difference between the 2 beams vary linearly, one is able to modulate in a complex spectrum a single element whose width is equal to the theoretical resolution limit of the grating. The solid angle of the admissible beam is much greater than a classical spectrometer, thus this method gives an important increase in luminous flux. The first such instrument is described together with the first experimental results.

378-53-510
520

01250

Cook, D. B.
Danby, C. J.

J. Sci. Instrum. 30, 238-40 (53)

A Simple Diaphragm Micromanometer

A diaphragm vacuum gauge covering the pressure range 1 to 100 μ with an accuracy of better than 0.5 μ is described. Movement of the diaphragm is followed by measurement of capacity change. The electronic circuit uses only one valve. The gauge is suitable for measurement of mass-spectrometer sample inlet pressures.

997-61-800

01260

Coon, J. H.

Rept No. 34 Contract Nonr-97801 (61)

An Electronic Differential Pressure Indicator for Static Measurement of Gaseous Fluid Flow

In constructing the Electronic Differential Pressure Indicator, components which were commercially available were used as much as possible. It was necessary, however, to construct a number of the components such as the input transformer and the oscillator transformer. In addition both the printed wiring board and the instrument panel overlay had to be designed and constructed. The device has been useful in measuring pressure differentials and velocities which are of low magnitude and has found additional use in determining directions of low velocity flows with the use of directional probes. The frequency response of the Electronic Differential Pressure Indicator is limited by the diaphragm and connecting tubes. It is sufficiently high to suggest the construction of an oscillator with a capacitance microphone in the tank circuit, for frequency measurements of air flow to investigate turbulence and flow separation. It is for this reason that provisions were made for an external input and an audio output in the construction of the Electronic Differential Pressure Indicator.

004-55-900

01270

Coope, V.A.R.
Mainjot, G.J.

Anal Chem. 27, 1478 (55)

Sensitive Determination of Low-Boiling
Organic Sulfur Compounds

The analysis of less than 0.00005 mole of H_2S (l) of thiol, with errors of several %, or 0.0003 mole of disulfide with errors of less than 1%.

997-59-440
610

01280

Corcos, G.M.
Cuthbert, J.W.
VonWinkle, W.A.

Rept. on Contract Nonr-222(30) (59)

On the Measurement of Turbulent Pressure
Fluctuations with a Transducer of Finite Size

The general problem of the mapping of random field by a linear operator has been treated, in particular by H.W. Liepmann and Uberoi and Kovasnay. The use of transducers of finite size for the measurement of pressure fluctuations within turbulent flows involves a systematic error which is an example of this mapping. The new feature of the problem is the coupling of the time and of the space domain caused by the apparent downstream convection of the pressure field which has been observed in turbulent shear flows. The problem is formulated for a field which is homogenous in the relevant coordinate axes and stationary. A model of the downstream convection is introduced and used to derive formulae for the distortion of the three-dimensional spectrum and of the frequency spectrum. For the three-dimensional spectrum, the formalism is that of Uberoi and Kovasnay. For the frequency spectrum, a somewhat more direct approach is presented although the results of Oberoi and Kovasnay are again useful in generalizing the convection model. The results confirm recent measurements which indicate that the frequency spectrum may be considerably in error for the higher frequencies even when the mean square pressure measurements are only slightly affected by the finite size of the transducer.

997-59-900

01290

Corey, H.S.

U.S. At. Energy Comm. Y-1275 (59)

Production Leak-rate-detection Systems

A discussion of the evolution of leak-rate-detn. methods and systems for the routine checking of sealed assemblies on production basis in the Y-12 Plant.

334-55-900

01300

Corne, C.L.

Ital. 531,347 (55)

Apparatus for Quantitative Estimation of Blood Serum Components Separated by Paper-Strip Chromatography or Electrophoresis

A device is described for translating the chemically developed colored bands of components sep'd. by paper-strip chromatography or electrophoresis to cathode-ray oscilligrams.

379-60-151

01310

Cossutta, D.
Stechelmacher, W.

J. Sci. Instrum. 32, 404 (60)

Lens, Mass-Spectrometer, Leak Detector

Describes a new type of mass-spectrometer leak detector using an ion-shrouded axially symmetrical magnetic lens for focusing ions in the low mass range.

004-56-153

01320

Craats, F. van de

Anal. Chim Acta 14, 136-49 (56)

Application of Vapor-Phase Chromatography
in the Gas Analytical Field

A partial review of gas-liquid partition chromatography with 20 references. The sepn. of hydro-carbon gases and the detn. of the components is discussed in detail. Certain screen fractions of ground insulating bricks proved to be more satisfactory as carriers than did Celite since resistance to flow was lower; resistance of such material at a grain size of 0.2-0.3mm was 1/3 of that of Celite but the sepn. effected were practically equiv. Low resistance permitted the use of columns as long as 6m. Velocity of gas was found not to be very crit.; for 6-mm dia. columns with Celite as the carrier, velocities between 0.5 and 5.0 l./hr were satisfactory. Expts. carried out with columns of different diam. from 4 to 14 mm. have shown that the sepn. efficiency is independent of the column diam. so long as the size of the sample is varied in proportion and the linear gas velocity remains the same. Suitable liquid phases are discussed. Two methods were used for the detn. of the components: continuous measurement of the thermal cond. of the gas mixt. leaving the column and measurement of the pressure increments obtained by collecting the components in an evacuated vessel after the CO₂ stripper gas had been removed by absorption in a caustic soln. The areas of applications and advantages and disadvantages of each of these methods is discussed.

980-51-153

01330

Cramer, E.
Muller, R.

Mikrochemic Ver. Mikrochim Acta 36/37
553-60 (51)

Separation and Determination of Small
Quantities of Gases by Chromatography

By making simplifying assumptions a formula is derived for the migration velocity of the zones in the chromatographic sepn. procedure. It is shown that a characteristic quantity of energy can be calcd. from every 2 migration rates. Sepns. were made with N, C₂H₂, CO₂, and CH₂:CHCl by passing 1-10 mg over an adsorption medium such as charcoal or silica gel with H as the eluting gas. The detn. of the thermal cond. was used in the analysis. Plotting the galvanometer deflections of the measuring set-up against the time gives curves from which the above-mentioned quantities of energy can be calcd. with an accuracy of 0.02-0.06 kcal per mole. Planimetry curves, preferably with the half-value widths, give a measurement of the components of a given gas mixt. within about 1%.

682-48-530
532

01340

Crampton, D.H.
Winnefeld, C.

Refrig. Eng. 35, 261-3 (48)

Leak Detection of Refrigerants

Methods now in use are the soap bubble test, sound effect, chem, swabs, halide torch, and the color tracer method. The color tracer method is one of the most dependable. A red oil-soluble dye dissolved in oil of medium viscosity is introduced into the refrigeration system and leaks are detected by observation on the distribution of the color.

010-59-153

01350

Cremer, E.

Arch Biochem, Biophys 83, 345-9 (59)

Gas Adsorption Chromatography

The fundamentals of gas-adsorption chromatography are discussed as well as expts on chromatography of CO and CO₂ on C and SiO₂ contg. different amts. of water.

963-51-153

01360

Cremer, E.
Muller, R.

Z. Elektrochem 55, 217-20 (51)

Separation and Determination of Substances by Chromatography in the Gas Phase

By use of a previously described method, a quant. sepn of acetylene and ethylene, of CO₂ and acetylene, and of ethylene and propylene, was achieved. Detection of a gaseous component without complete sepn. is possible by observing the breakthrough time characteristic of a substance. This is possible only if the breakthrough time is independent of concn., which is true, for acetylene and ethylene on finely divided SiO₂ gel. Three methods are described for detg. the energy difference of pairs of adsorbates, where t_1 and t_2 are the differences between the time taken by the substance to traverse the adsorbent and that taken by the carrier gas. Detn. of gaseous components is possible by measuring the area under the plot of galvanometer deflection against time.

004-48-420

01370

Crouthamel, C.E.
Diehl, H.

Analyt, Chem 20, 515-20 (48)

Gas Analysis Apparatus Employing the
Velocity of Sound

A brass tube of fixed length containing the gas has a transmitter at one end and a microphone at the other. Change in gas composition causes departure from resonance conditions, and change in microphone output. An amplifier feeds a meter calibrated directly in terms of the composition, and a warning can be given when one component exceeds a preset proportion.

997-60-624
900

01380

Cubiccioiti, D.
Milne, T.A.

Contract AF 39(638)89 (60)

The Energy of Polymerization of the
Gaseous Alkali Halides

An investigation was made of the energy relationships among the important molecular forms in the gas and the condensed phases of the alkali halides, in particular, the energy of formation of polymers from their monomers has been investigated. The binding energy of the polymeric molecules relative to the monomeric form has been determined for the alkali halides both experimentally and theoretically and some insight into the nature of their interatomic forces has been gained.

980-59-900

01390

Curniue, C. Level de

NSA V14 Ads No. 9628 (59)

Leak Testing by Means of Helium

997-58-900

01395

Cussen, A.J.

NOLC rept 144 NAVORD rept 4610 (58)
AD 151 992

Characteristics, of Photoconductive Detectors

A description of the basic characteristics of photoconductive detectors is given to aid in the interpretation of data obtained in photoconductive research and experimentation. Properties described include variation in signal and noise with bias voltage frequency response; time constant; spectral response; black body sensitivity; temperature dependence; and sensitive contours.

684-60-151

01400

Daly, N.R.

Rev. Sci. Instrum. V31 No. 7 720-23 (60)

High Sensitivity Mass Spectrometer Leak Detector

A new type of mass spectrometer ion detector is described and some of its applications discussed. A positive ion entering the detector is accelerated onto a thin metal foil where it releases secondary electrons, which are in turn accelerated on to an organic scintillator viewed by a photomultiplier; this measures the total ion beam. Those ions which penetrate the foil sufficiently release secondary electrons from the back of the foil, and these are detected in a similar way. The transmission properties for many light ions has been investigated and it has been found that the foils have high transmission for helium ions and high rejection for "air" ions. The results obtained can be applied to improving the sensitivity of leak detectors, appearance potential measurements, and the analysis of small quantities of deuterium in hydrogen. This is a large instrument and must operate in a vacuum.

Work done at At. Weapons, Res. Est., Aldermaston, Berkshire, Eng.

378-53-133

01410

Dardel, G. von

J. Sci Instrum V30 No. 4 114-7 (53)

Combined Pirani and Ionization Gauge
Circuit

Features of vacuum meter in which Pirani gage is of constant temperature type with working range of 10^{-2} to 10mm of Hg; as leak detector, it may be used even at atmospheric pressure; or higher; emission current of ionization gage is held constant within 3% during entire tube life by stabilizer; ion current is measured by electronic voltmeter.

095-56-112
900

01420

Davis, A.D.
Howard, G. A.

Chem and Industry (56)
An Anemometer-type Bead Thermistor

An anemometer-type bead thermistor was used successfully at temperatures up to 170°.

382-58-152
153

01430

Davis, A. D.
Howard, G.A.

J. Appl. Chem 8 pt3; 83-6 (58)

Thermistor Detectors in Gas Chromatography

Details are given of a simple and easily constructed instrument employing a thermistor detector, for work on gas chromatography. Necessary precaution and conditions for use of a thermistor detector are outlined.

980-58-120

01440

Davtyan, O.K.

Zhur. Fiz. Khim. 32, 935-6 (58)

A New Method of Leak Detection in Vacuum
and High Pressure Systems

An oxidation indicator for a gas leaking through defective places in an app. by oxidizing it with a Pt or Pd catalyst can be used, i.e. the sharp rise in temp. when the gas in H was observed either visually or with a thermocouple. The app. if intended for use in vacuum, can be tested with the gas inside at slightly above atm. pressure.

801-49-143

01450

De Forest, T.

U.S. 2,472,522 (49)

Leak Detection

Leaks in a closed vacuum system having walls transparent to visible light and fluorescigenous radiation, such as a radio tube, are detected in a 3-stage process, comprising; (1) applying to the outer surface of the wall of the tube a testing liquid consisting of a vehicle which wets the wall being tested, and a fluorescent agent dissolved in the vehicle, (2) removing the liquid from the outer surface; and (3) subjecting the tube to ultraviolet radiation to cause the testing liquid which has penetrated through leaks to the inside of the tube to fluoresce and thereby reveal the leaks. Three suitable liquids are: ethylene glycol monovutyl ether 99.5% and the ethyl ester of m-monoethylaminophenolphthalein 0.5, triethylene glycol 49.8%, octylneale 50.0 and fluorescein Na salt 0.2; and Kerosene 94.75%, "Flurol 5GA" 0.25. and kerosene-sol, naphthenic acid soap 5.0.

980-38-100

01460

Degea, A.G.

Brit. 496,345 (38)

Gas Detection

Deisler, P.F.
McHenry, K.W.
Wilhelm, R.H.

Analyt, Chem. V27 No. 9 1366-74 (55)

Rapid Gas Analyzer Using Ionization by
Alpha Particles

A method and apparatus are presented for analysis of a flowing or quiescent gaseous mixture by means of ionization of the mixture using alpha-particles from polonium in an aged radium D source. By utilizing a proper combination of applied voltage and electrode spacing in the ionized mixture, ionization currents of the order of 10^{-8} A are obtained. The current depends in its precise value on the composition of the gas at constant temperature and pressure. Primary calibration is necessary with recalibration or compensation at intervals, because of radioactive decay of the source. Electrical output may be recorded by a variety of devices or used in control systems. In principle, gases of different molecular, atomic, or electronic structure should be capable of differentiation. Theoretical time of response is on the order of 10^{-3} sec. Precision of analysis was about 0.2 to 0.3 mole.

Deissler, R.G.

Trans, Am. Soc. Mech. Engrs. 73, 101-7 (51)

Investigation of Turbulent Flow and Heat
Transfer in Smooth Tubes, Including the Effects
of Variable Fluid Properties

Equations are derived for the prediction of radial velocity distributions for fully developed turbulent flow in smooth tubes both with and without heat transfer. The analysis results in an equation which represents both the conventional buffer layer and the laminar layer. To check the analysis and det. values for the constants in the equations, detns. were made of fully developed velocity distributions for air flowing without heat transfer in a smooth tube. The trends predicted analytically were found to be similar to those detd. experimentally by measuring the av. surface heat-transfer coeffs. and friction factors of air flowing in tubes.

997-58-612

01490

Delforge, G.

Rept. of Contract AF 18(600)681 (58)

A Study of Vortex Production in Pipe Flow

A brief review of the theodorsen theory in which he describes the origin and basic structure of turbulence is presented. The experimental procedure used and results obtained in attempting to find the basic structure occurring when a flow is transformed from a laminar to a turbulent nature by the use of artificial disturbances, and verification of results obtained by other investigators is given. From the investigation conducted, it was found that the horseshoe-shaped vortex does exist in laminar pipe flow, for the range of Reynolds numbers investigated, when the flow is suddenly interrupted by an artificial disturbance. The sequence of events following the formation of this system of vortices to transition compares with that given by Theodorsen. The inverse relation between the disturbance Reynolds number and transition Reynolds number as predicted by Theodorsen was found to exist. From visual observations, the basic structure of the vortices formed when a flow is transformed from a laminar to a turbulent state without artificial disturbances present appears to be similar to that obtained with artificial disturbances. The above results agree favorably with those found by other investigators.

240-59-154

01500

Deutsch, I.

Gas 35 No. 12 66-9, 72-3 (59)

Advanced Technology Applied to Leak Detection

App. has been developed combining a silica gel chromatographic column 14 ft. long with an infrared detector. This method distinguishes natural gas from soil gases, sewage gas, etc. by showing a deflection owing to C_2H_6 , in addn. to the usual CH_4 band. This app. is being adapted to mobile use. The infrared detector alone fails to distinguish between soil or sewage gas and natural gas.

098-59-153

01510

DeVita, M.
Caprioli, G.
Pavan, E.

Chim e Ind. 41, 292-4 (59)

Analytical Applications of Gas Chromatography

Small amts. of CO_2 , ethylene, ethane, propane, isobutane, butane, and 1-butane were detd. in CH_4 . The best results were obtained with Celite C-22 in a column 4mm long and 6mm wide at 0° . The impurity content of tech. CH_4 lies between 10 and 50 p.p.m. and 1%.

441-59-800

01514

Devienne, F.M.
Roustan, A.F.

Lab. Mediterranee de Recherches
Thermodynamiques (France) (59)

Use of the Revolving Arm Method for the
Determination of the Stagnation Temperature
in an Ionized Gas

999-58-112

01515

DeWaard, R.
Wormser, E.M.

Barnes Engr. Co. Stamford, Conn. (58)

Thermistor Infrared Detectors Ptl
Properties and Developments

This surveys the state of the art of thermistor infrared detectors and compares these detectors to other thermal and photoconductive infrared detectors. It surveys improvements in the properties of thermistor infrared detectors accomplished during the period 52-57 at Barnes Engineering Co. First efforts were concerned with developing techniques for producing thermistor infrared detectors, with minimum noise level. Other early efforts concerned themselves with eliminating "swish noise", a type of noise caused by vibration of gas in the detector capsule when subjected to mechanical vibrations. The greatest development effort has been applied and the most significant advances have, however, occurred in the fundamental detector properties of time constant and responsivity, which combine to determine "detectivity". A significant advance in thermistor detector technology is a new manufacturing process employing "printing" techniques. The "printing" technique lends itself to mass production of thermistor detectors of a given size or pattern, once the requisite tooling has been accomplished. It is expected that in the future detectors of uniformly high quality can be produced by this process at a greatly reduced cost.

721-48-151
520

01520

Dibeler, V.H.
Taylor, T.I.

Science 108, 686-8 (48)

Construction of Glass Diaphragm Leaks for
Gas Analysis with a Mass Spectrometer

Satisfactory gas analysis with a mass spectrometer require mol. flow through a small hole in a thin diaphragm. A hole of 0.04mm in a glass diaphragm 0.09mm thick can be made by following the detailed instructions. At a pressure of 0.05mm of Hg the mean free path is greater than the hole diam. and with N_2 at 300°K the rate of effusion is 0.33mg/day.

980-58-100

01530

Diels, K.
Jaekel, R.

Springer-Verlag (58)

Leybold's Vacuum Pocket-Book for
Laboratories and Industry

The book provides comprehensive data based on a minute scrutiny of the literature and on the long experience of Leybold. It is divided into fifteen chapters, beginning with a summary in tabular and graphical form of the most useful formulae and results of the kinetic theory of gases. General problems of pumping are then discussed, including the use of gas ballast and cold traps for pumping condensible vapours. A section of the book is concerned with the measurement of pressure and the detection of leaks. The information is here arranged in a form most convenient for the designer of a complete vacuum system, guidance being given at each stage on the choice of the appropriate pump or gauge. The second half of the book is concerned with design problems in metallurgy, freeze-drying, and vacuum impregnation. Extensive tables are provided of physical properties relevant to vacuum engineering.

528-51-510

01540

Dibeler, V.H.
Cordero, F.

Nat. Bur. Stand. J. Res. V46 1-4 (51)

Diaphragm-type Micromanometer

A diaphragm-type micromanometer is described that is capable of measuring pressures in the range of 1 to 100 microns with a sensitivity of about 0.1 micron on the 50 micron scale. The displacement of a thin diaphragm is measured by the change in mutual inductance of two coils mounted above the center of the diaphragm.

980-40-111

01550

Dilda, G.

Alta Frequenza 9, 594-620 (40)

A Turbulence Analyser

A description of an apparatus for the analysis of turbulence in wind tunnels. It consists of a Pt wire anemometer, 0.01mm dia. and a few millimetres long, mounted on a suitable support permitting adjustment of the wire along the cross-section of the wind tunnel under test. The wire is heated to a high temperature by d.c. The resistance variations produced by the cooling effect of the turbulence develop a variable voltage which is amplified by a 4-stage amplifier of gain $\times 10^6$ which also compensates for the thermal inertia of the wire. A description is also given of the measuring instrument and of the bridge circuit for calibrating the whole apparatus. Curves and experimental results are reported, which show the behaviour of the apparatus and its possible applications.

383-59-153
220

01560

Dobbs, H. E.

J. Chromatog. 2, 573-4 (59)

A Simple Arrangement, using a Standard Geiger-Muller Tube, for the Continuous Monitoring of Radioactive Effluents From A Chromatography Column

105-57-110

01570

Dognin, A.

C.R. Acad. Sci V244 No. 20 2484-5 (57)

On the Representation of Thermal Conductivities of Gaseous Binary Mixtures

The three relationships of Lindsay and Bromley and the author for the thermal conductivity of a mixture of two gases are shown to be equivalent in certain circumstances. Applied to the experimental results for the mixture of air and carbon dioxide the relationships agree within 1/600 at 40°C.

997-61-800

01580

Doucette, E.I.

Contract AF 19(604)8430 (61)

Materials for and the Mechanism of Gettering Multiple Component Gases

A basic vacuum system for the study was constructed utilizing an omegatron mass spectrometer which is driven by an automatically recycling oscillator. In this way a complete spectrum of mass composition at frequent intervals may be obtained throughout the gettering process. By taking into consideration the probabilities of the various reactions and interactions, an expression is obtained for the fraction of surface sites covered at the getter surface. This expression is then used to predict the expected behavior of a continuous getter under various conditions of temperature and pressure.

684-46-900

01590

Downing, J. R.
Mellen, G.

Rev. Sci. Instrum 17, 218-23 (46)

A Sensitive Vacuum Gauge With Linear Response

The gauge is actuated by the ionization current resulting from a minute quantity of Ra. Range: 3 Steps 0-0.1, 0-1, and 0-10mm Hg, selected by switch.

980-40-900

01600

Dragerwerk, H.

Ger. 697,124 (40)

Antifreeze Substance for Tannin Solutions
Used in Gas-Detection Apparatus

The freezing is prevented by the addn. of glycerol, lower alcs. or dextrose.

980-40-154

01610

Dragerwerk, H.
Drager, B.

Ger 691,442 (40)

Detection of Deleterious Gases

The air is passed through a glass tube filled with a colorless gel saturated with a suitable indicator, e.g., Au chloride for dichlorodiethyl sulfide. The gel is soaked in nitrate soln. of the metal-indicator, then dried and the metal reduced. The finely divided metal serves as indicator.

842-59-151

01620

Drawin, H.W.
Kronenberger, K.

Vacuum-Tech 8 128-37 (59)

New Portable Bench-Type Mass Spectrometer

A new Mass spectrometer is described for detecting leaks in vacuum and pressure systems, and analysis of simple gas mixts. This instrument provides a 180° ion deflection in a permanent magnetic field, and 3 mass ranges with controllable ion accelerating voltage: mass 2-23, 4-46, and 8-92. By using He the sensitivity for leak detection is 5×10^{-11} cc/sec; 1 p.p.m. He in air can be detn.

980-59-151

01630

Drawin, H.W.
Kronenberger, K.

Instrum. Kde. V67 157-61 (59)

A New Universal Portable Mass Spectrometer
For Leak Detection

A portable table mass spectrometer which was designed especially for the mass spectrometric leak detection on vacuum and pressure apparatus is described. It is suitable for the analysis of simple vapour and gas mixtures. Results of measurements obtained are given and the use of the apparatus for leak detection is described.

004-56-151

01640

153

Drew, C.M.
McNesby, J.R.
Smith, S.R.
Gordon, A.S.

Anal Chem. 28, 979 (56)

Application of Vapor-Phase Chromatography
to Mass Spectrometer Analysis

A technique is described for the analysis of gaseous mixt. by vapor-phase chromatography with simultaneous recovery of a portion of each sepd. fraction for mass-spectrometer analysis. The procedure is valuable for pos. identification of fractions and permits the analysis of mixts. having identical emergence times.

980-61-154

01645

Drexler, M.

Airkem, Inc. N. Y. Contract AF 30
(602) 2302

Barchas, M.

Proj. 5534

Chemo-Electrical Sensing Device

The feasibility of utilizing gas adsorption phenomena in the identification and quantitative determination of various gaseous materials was investigated. Factors influencing the performance of the various components of an experimental gas analyzer based on the measurement of characteristic adsorption energies are discussed. Instrumentation specification included ability to detect and measure concentrations of 10ppm or less of NO, NO₂, N₂O₃, HCl, HF and O₃ in air, irrespective of the mixture involved.

997-60-900

01650

Dulgeroff, C. R.
Kerrisk, D. J.

Contract AF 33 (616) 5972 (60)

Summary Report for the Design of An Ion Rocket Research Device

A bell jar vacuum system and a vacuum chamber used for research on high current density ion sources are described. Porous samples of nickel, graphite, tungsten, tantalum, and titanium carbide were tested for ability to produce cesium ions by surface ionization. Nickel and graphite were inadequate because of reactions with cesium vapor. Tungsten, tantalum, and titanium carbide produced positive ions. Tungsten produced current densities up to 12ma/cm², and has ionization efficiency greater than 90%. Secondary electron emission studies were made to ensure true current measurements. An analytical study of arc type ion sources was made to determine types best suited for high current density ion beams.

980-58-153

01660

Dumay, H.

J. usines gas 82, 107-14 (58)

Chromatographic Examination of Industrial
Gases by Means of a Semiautomatic Apparatus

App. and procedures are described for detg. components of industrial and city gases by adsorption and partition gas chromatography. CO_2 is the eluent, it is absorbed from the exit gas in KOH. Components are measured in a horizontal buret. The meniscus is followed by the operator by means of a finder coupled with a pen that records the emergent zones on a const.-speed strip chart. An integral plot is produced. Column fillings used to date are activated C, SiO_2 gel, and C-22 firebrick impregnated with dioctyl phthalate. Curves and calibration graphs are given.

842-110-133
151-510

01665

Vacuum Techniques 370-86

Dushman, S.

General outline of Leak Detectors.

999-55-900

01670

Dussourd, J.L.
Shapiro, A.H.

Mass. Institute of Tech. (55)

Deceleration Probe for Measuring Stagnation
Pressure and Velocity of a Particle-Laden Gas
Stream

The measurement of the stagnation pressure and, from this, the velocity of the gas phase, in a stream of gas laden with liquid droplets or solid particles is investigated theoretically and experimentally. The theoretical findings are checked by the testing of a series of experimental probes of varying geometry in an air stream carrying water droplets. Satisfactory agreement exists between theory and experiment. It is shown that a practical probe can be built to give a negligible error in the measurement of stagnation pressure in the range of variables investigated. Further it is found possible, with simple modifications, to adapt the experimental probe conveniently to the local measurement of other stream properties, namely, the mass rate of flow per unit area of particles, the particle size, and the particle velocity.

980-59-153

01680

Duswalt, A.A.

U. Microfilms, L.U. Card No. Mic 59-1615
108 pp (Purdue)

Analytical Applications of Gas Chromatography

Consisted of the combustion of the sample in an O_2 stream.

321-54-133

01690

Dutt, P.K.

Indian J. Phys. 28, 1-8 (54)

A Demountable All Metal Hot-Cathod Vacuum
Ionization Gauge

A gauge has been constructed whose filament can be changed any number of times without a change in the operational characteristics. The Characteristic curves of the gauge are given. Some points toward the constructional improvements are discussed which might give better sensitivity.

980-38-900

01700

Duval, C.
Mazars, G.

Compt. Rend. 207, 962-4 (38)

Drop Tests for the Halogens

Discussion of tests performed on the halogens, with different solutions and paper.

962-59-111

01710

Dutt, P. K.
Mukherjee, S. K.

Z. angew. Phys. 11, 470-4 (59)

A Palladium Pirani Gage

The usefulness of a Pirani gage, sepd. from the vacuum system through a Pd wall, as a leak detector with H as probing gas was investigated. A threshold H pressure exists below which detection is not possible and this threshold pressure depends also on the pressure of other gases present in the system, e.g. air. To increase the sensitivity of such a device it is necessary to use a selective adsorber, e.g. an air-cooled charcoal trap, in front of Pirani gage. Pirani gage conversion factors for H and D were detd. and were found to be not even approx. const. over the Pirani sensitivity range.

962-53-111

01720

Ebbinghaus, E.

Z. angew. Phys. 5 No.8 294-7 (53)

Oxygen Measurement on a Magnetic Basis With Strong Suppression of the Zero Point

Modifications to an oxygen meter, dependent upon the cooling of a heated filament when the surrounding gas is subjected to an inhomogeneous magnetic field, are described. By alteration of the inclination of the measuring tube dynamic compensation of the magnetic wind may be obtained and the range of operation restricted with a gain in sensitivity. In this way an accuracy of 0.01% has been attained in the concentration range 20-21% oxygen.

684-58-800

01730

Ehlers, K.W.

Rev. Sci. Instrum. 29, 72 (58)

Constant-Pressure Leak-Rate Gage

The rate at which a gas was admitted into a vacuum system has been metered by the leak-rate gage described, which also permitted the metering of gases other than air and at pressures other than atm. The amt. of gas admitted into the system was detd. by the rate at which a Hg plug moved through a horizontally mounted glass tube of calibrated vol. The app. has been used in detg. ion-gage sensitivities and diffusion-pumping speeds for various gases and also has been used to det. the gas flow required by ion sources during actual operation.

980-57-800

01740

Eisenbarth, H.

Ger. 962,475 (57)

Apparatus for Detecting Gases and Estimating
Their Concentration

244-59-900

01750

Elliott, F.G.H.

Gas J. V186 No. 10 18-20 (59)

Systematic Approach Proves Practical for
Leakage Mitigation and Replacement

Description of system controlling leakage and replacement practices as used by San Diego Gas and Electric Co.; sources of leak reports; use of bar hole surveys to gain supplemental evidence in support of replacement request; records used and maintained for system are consecutively numbered leak folders.

999-43-151

01760

Ellis, C. B.

SAM Labs (KZ-3423) (43)

Vacuum Testing Handbook for Columbia
Project, Section 106

A procedure is described for testing vacuum systems for leaks. A portable mass spectrometer is used to detect . He introduced into the system after first creating a vacuum. The testing equipment is described in detail and illustrated, and operating instruction are included.

242-58-153

01765

Ellis, J. F.
Iveson, G.

Gas Chromatog. 300-8 (58)

Application of Gas-Liquid Chromatography
to the Analysis of Volatile Halogen and
Interhalogen Compounds

Both a Martin d. balance and a katharometer have proved satisfactory as detectors. Details of construction and illustrations of the operation of the app. are given.

980-60-800

01770

Elsaesser, F.
Kienel, G.

Vakuum-Technik V9 No.5 119-21 (60)

Eine Hochwirksame Metallkuehl falle Fuer
Ultrahochcakuum Apparaturem

Very efficient metal cooling rap for ultra-high vacuum apparatus; new design of metal refrigeration trap is described which incorporates all advantages of commonly used cooling traps; high efficiency is achieved by requiring each molecule to strike cooled surface minimum of 4 times before entering vacuum chamber; trap is connected to system through two connecting flanges.

561-55-430

01780

Enright, R.J.

Oil and Gas J. 53, 78-9 (55)

Listening for Leaks

Listening for leaks with a microphone in piping for escaping gas or liquid.

967-52-144

01790

420

440

Zh. Tekh. Fiz. 22 No. 6 1022-8 (52)

Ershov, V.N.

A Method of Gas Analysis Based on Optical and Acoustical Phenomena

The method described was suggested by M.L. Veingerov in 1938 and is based on measurements of the energy of acoustic oscillations set up in the gas and converted into electric current, this being an appropriate test method for many technological processes on which process control apparatus may be based. The calibration curve of the apparatus depends on the spectral characteristic of the material of the windows transmitting the radiation, the thickness of the irradiated gas layer, the concentration of the absorbing component in the absorption chamber, the temperature of the radiator and on the reflection characteristic of the walls of the absorption tube. The radiation used is a practically parallel beam of i.r. light, the emitter an electrically heated silite plate. To avoid the Bell effect, the membrane used as transducer must not be irradiated. The windows of the rotating disk producing the intermittence of the radiation may consist of quartz, glass, NaCl or the like.

684-62-800

01800

Estin, A.J.

Rev. Sci. Instrum 33 No. 3 369-71 (62)

High Mode Tunable Cavity for Microwave Gas Interactions

A high-Q resonant microwave cavity, operating in the TE_{01n} mode, is described. A fused quartz liner, with suitable inlet and pumping lines, is used to contain gases, so that interaction between the molecular transitions and the electromagnetic radiation can be generated. Techniques are discussed for suppression of unwanted modes of oscillation, for dielectric tuning of the cavity and for elimination of radiation through a large port.

980-55-130
800

01810

Evans, F.P.C.

Atomic Weapons Res. Est. England (55)

Calibration of Arcton Leak Detector

A B.T.H. Arcton Leak Detector was calibrated by observing the output current of its control unit as various concentration of arcton in the air were applied to the probe. Observations were made in the concentration range of 0 to 3 parts per thousand of the halogen compound vapor in the air. It was concluded that calibration changes with continued use.

372-51-612

01820

Evans, S.I.
Sarjant, R. J.

J. Inst. Fuel 24, 216-27 (51)

Heat Transfer and Turbulence in Gases Flowing Inside Tubes.

004-57-153

01825

Farlow, N. H.

Anal. Chem 29, 881 (57)

Chromatographic Detection of Mixed Halide Ions in 10^{-10} Gram Particles

Mixed soluble chlorides, bromides and iodides in a single microscopic crystal can be determined by precipitating the mixed halide crystals on a transparent gel film in which colloidal silver dichromate is dispersed. The particle containing the mixed halides is dissolved by water vapor and diffuses into the film, where the halide ions precipitate as silver halide. The ions from concentric bands and the area covered by each band is semiquantitatively related to the amount of halide ion present. The limit of detection is of the order of 5×10^{-11} gram of halide.

999-57-220

01830

Farmer, R.W.
Reiner, O.

UCLA Contract AT-(04-1)-Gen-12 (57)

A Time of Arrival Indicator for Radioactive
Fallout

This report describes an instrument designed to record the time of arrival of radioactive fall-out material. The unit incorporates its own power supply, it can be operated unattended for a period of about four weeks, is rugged enough to tolerate the treatment normally associated with field operation and it is comparatively inexpensive. The unit responds to the absolute level of radiation and, in practice, has been used to detect a radiation level of 2 milliroentgens per hour.

801- -110

01840

Farr, W.H.
Fagen, W.F.

U.S. Patent No. 2,400,923

Gas Detection Apparatus

An apparatus for detecting or indication the presence of a fluid, it has a variable resistance heated filament in a chamber surrounded by a chemically inert, loosely packed, fibrous material to diffuse the flow of the fluid around the filament and to prevent convection currents from occurring within the chamber.

043-57-153

01850

Feichtinger, H.

Brit. 785,815 (57)

Gas-Analysis Apparatus

A mixt. of gases to be analyzed is passed step by step through a series of interconnected absorption bulbs. The vol. of gas entering or leaving each chamber at a const. pressure is detd. by measuring the vol. change of a conveying fluid, such as Hg or oil. The fluid is propelled by a piston directly coupled to a gage, which measures the fluid displacement.

091-57-110

01860

Fiehman, J.

Chem. promysl 7, 605-6 (57)

Gas Analyzer

A device was developed for the analysis of gases in the atm. based on the principle of indirect measurement of thermal cond. of the mixt. of 2 gases, provided their thermal conductivities are adequately different. The analyzer can be used for practically every range of measured concns. of two different gases.

528-54-800

01870

Fitzmaurice, J. A.

Nat. Bureau of Standards Contract AF (33-616) 52-5 (54)

Survey of Methods for the Determination of Oxygen in Oxygen-Enriched Air.

082-53-133

01880

Fitzosborne, F.J.

Can J. Physics V31 No. 1 11-14 (53)

Simplified Ionization Gauge Circuit

Stable circuit for vacuum measurement; ratio of ion current to electron current is indicated for ionization gage, giving vacuum reading independent of variables such as filament emission schematic diagram.

362-55-300

01890

Florio, F.

Jet Propulsion V25 235-6 (55)

Automatic Safety Devices for Rocket
Propelled Aircraft

Described is a unique liquid-leak detecting device for use with HNO_3 rockets, NaOH is wrapped in a gum-backed coating which is destroyed by liquid HNO_3 . There's an electrolytic connection made between 2 Ag-sheet electrodes, thus permitting a current to flow to a warning light or relay. The small unit is about 1 in. in dia, and one drop of HNO_3 establishes a current of 150ma in 0.2 sec

980-45-133

01900

Fogel, C.

Amer. Phys. Soc. (45) Abstr. in Phys. Rev,
68, 101 (45)

Ionization Gauge of Simple Construction

A gauge is described for measuring pressures from 10^{-4} to 10^{-8} mm Hg. Except for a multiplying factor of 10, it gives a direct reading of residual air pressure. It uses 2 plates as the electron and ion collector respectively. They are located on opposite sides of the filament, but equidistant from it. This allows easy outgassing of parts, either by electron bombardment or by r.f. heating. A protective shield in front of the ion collector aids in reducing the electrical leakage to that element. Danger of filament burn-out due to vacuum leaks was removed by using an oxide-coated filament.

684-49-144
150

01910

Fowler, R. C.

Rev. Sci. Instrum. 20, 175-8 (49)

A Rapid Infra-red Gas Analyzer

A brief description of an apparatus, together with a few representative curves, is presented, suitable for measuring the composition of very small amounts of any gas having at least one near i.r. absorption band or, if measured in the presence of other gases, at least one unique absorption band. With the bolometers used 90% full scale response is obtained in 0.15 sec on a 0.5 cc sample, permitting a 0.4 cm optical path and a very nearly linear response over the range usually found in physiological concentrations and anaesthesia.

999-56-142

01920

Fraenkel, G. K.

Columbia U. Dept. of Chem N. Y. (56)

Paramagnetic Resonance of Free Radicals

The elementary principles of paramagnetic resonance absorption spectroscopy are reviewed from the point of view of the detection identification and estimation of free radicals.

241-52-100

01930

Fraser, W. R.

Gas Age 93, 15-20 (52)

Utilization of Gas Detectors

Use of detectors for locating atmosphere contaminants encountered in gas production and distribution; materials contaminating atmosphere causing either oxygen deficiency or creating combustible or poisonous conditions; description of miners lamp and various other types of detectors.

980-40-900

01940

Fredlund, E.

Ark Mat. Astr. Pys. 27A 2, No. 12 (40)

Absolute Measurements of Radiometric Action
in Gases II

An electromagnetically compensated radiometer is used to make radiometric measurements in He, H₂, D₂, O₂, A and N₂. Radiometric curves connecting log R with Log P in the various gases can be made to coincide over almost their whole pressure range by suitable relative displacements. By a suitable transformation, curves obtained on a similar radiometer with a different plate separation can be fitted to a general reduced radiometric curve.

999-61-800

01950

Friedman, H.L.

Space Science Lab. G.E. Co. Phila. Pa. (61)

A Gas Chromatography Valve for Vacuum
Sampling of Gases

The design, construction details, and technique of operation is presented for a valve assembly which may be used to inject gas samples from a vacuum system into a gas chromatograph.

402-49-900

01960

Gabrilovich, A.B.

Kolloid Zhur. 11, 17-23 (49)

Piezodilatometric Method and Some of its
Applications

Since compressibility B of gases is much greater than that of liquids, the presence of even 0.01% of gas can be detected by a measurable increase in B. For the expts. a dilatometer was used, capacity 2ml., with a capillary, cross-sectional area 0.2 sq mm. When the capillary and the space around the dilatometer were connected to an air reservoir at 600 mm Hg the expansion was sufficient to calculate B. The dilatometer was immersed in a Dewar flask filled with H₂O; this flask was kept in a H₂O thermostat. If the temp. in the outer thermostat was const. within 0.01° the temp. in the Dewar flask was const. within 0.0001°. The PhMe thermometer used was read to 0.0001°. Tarusov observed contraction on immersing frog muscles, etc., in physiol salt soln. and its variation in the presence of toxins. Detn. of B proves that this contraction is due to gradual dissoln. of gas originally present in the animal tissue and is not a measure of the binding of H₂O by the tissues. Fresh tissue may contain as much as 4 cu. mm of gas per 0.4 g.

684-54-151

01970

Garfunkel, M. P.
Wexler, A.

Rev. Sci. Instrum V25, 170 (54)

Helium Mass Spectrometer Leak Detector

This article deals with the demagnetizations of paramagnetic salts to temp. below 1°K. This is a commercial leak detector used for measuring very low pressures at liquid temperatures is discussed.

241-40-800

01980

Garner, J. B.

Gas Age 86, 47-50 (40)

Pittsburgh's Investigation of Gas Leakage

Natural gas leakage investigation in Pittsburg area with a description of the equipment used.

961-59-153

01990

Garnova, T. G.
Zlotnikov, L.E
Moshinskaya, M. B
Paradzhanova, N.G
Shvartsman, V.P.

Zavodskaya Lab. 25, 157-9 (59)

Apparatus for Chromatographic Analysis of
Gases using a Non-Stationary Heat Field

The process refers to the use of a non-stationary heat field in order to effect more efficient sepn. of C_1 - C_3 hydrocarbons and all isomers of butane, butylene, pentane, and amylenes. The gas analyzer of the KhT-2 type and the universal KhT-3 app. were tested. In these gas analyzers, unlike app. based on low-temp rectification liquid N is not used and the vol. of sample required is very low. The results compared favorably with those obtained with the Podbielniak app. commonly used in petroleum refineries.

378-48-113
133

02000

Garrod, R.I
Gross, K.A

J. Sci. Instrum. V 34 No. 12 496-500 (57)
J. Sci. Instrum. Phys. Ind. 25, 378-83 (48)

A Combined Thermocouple and Cold-Cathod Vacuum Gauge

The design, construction and performance of a vacuum gauge covering the range 10^{-1} to 10^{-5} mm of Hg are described. It consists essentially of two elements in a common envelope; a thermocouple gauge for pressure measurement in the range 10^{-1} to 10^{-3} mm, and a cold-cathode discharge gauge for pressures below 10^{-3} mm. A simple means for initiating the discharge in the latter gauge at low pressures is included. Design data for optimum performance of each element are discussed, and the cause of the "reversal effect" common in thermocouple gauges, has been investigated.

378-57-143

02010

Garton, W.R.S.
Webb, M.S.W.
Wildy, P.C.

The Application of Vacuum Ultra Violet Techniques to the Continuous Monitoring of Trace Concentration of Water in Several Gases.

A method for the determination of water in several gases is outlined, in which use is made of the absorption bands of the water molecule in the 1200A region. A 20Mc/s electrodeless discharge in hydrogen excites the 1216 A Lyman line very strongly and relatively free from neighbouring lines and bands. The radiation passes through the absorption cell, closed at both ends by LiF windows, on to the W cathode of a photomultiplier, which is insensitive to light of wavelength longer than 1400 A.

980-46-146
800

02020

Gatterer, A.
Frodl, V.

Ricerche spettroscop 1, 201-44 (46)

Spectrochemical Detection and Determination
of the Halogens and Other Nonmetals by
Ultra-High-Frequency Excitation

A Siemens-Reiniger radio-therapy outfit with an output of 600w. at 3-8m was used to excite an electrodeless discharge. Ten-mg portions of solid alkali halides, Se, S, or other volatile substances were carefully dried, placed in a boat, and placed in the emission tube. The latter was then completely evacuated, flamed, and the ultra-high-frequency field applied. Exposures lasted 30-120 sec; only the region 4100-7100 Å. was covered. Blank runs showed lines of H, Hg, O, Na, N₂, C₂, CO, CN, and CH, tables of which are given, but these lines practically disappeared in the presence of samples. The broadcast energy sufficed both to volatilize the sample and to excite the vapors. The low ionization potentials of the alkali metals did not prevent the obtaining of halogen lines.

980-50 100 161
111 200
144 400
151 622
154

02030

Gaudry, H.

Compt. Rend. Congr. und. gaz Paris 67,
429-53 (50)
Current Methods of Detecting Gas Leaks

A report of phys. and chem. methods of detecting gas leaks. The methods discussed include diffusion, thermal cond., infrared spectra, mass spectra, acoustical, catalytic combustion, specific reactions, odor, and radioactive tracers.

980-54-151

02040

Geller, R.

Comm. Energie Atomique Rapp N 325 (54)
The Leak Problem in Vacuum Systems

The first part of this paper is given to the consideration of leaks in vacuum systems and their detection. Special attention is given to detection by a He spectrometer. The second part gives a detailed study of the analyzer and ion source in the experimental set-up. The technological and mechanical aspects of the apparatus and its performance are discussed.

845-55-151

02050

Geller, R.

Le Vide 10, 119 (55)

Sensitivity of a Mass Spectrometer as a
Leak Detector

The smallest quantity of He which can be detected by a new type of He leak detector is 1 mol. in 400,000. The smallest leak rate in cu. mm/hr which can be detected is given by the formula $Q = SPO_0 / H$ (cc-st / v) where V and P are the vol and pressure of the vacuum chamber S, the pump speed, H the helium pressure, and the time of application of the jet. Therefore in case of a small vacuum chamber much smaller leaks can be detected.

845-51-151

02060

Geller, R.

Vide, 12 No. 71 398-406 (57)

Leak Detection of Vessels Under High Pressures
With a Helium Mass Spectrograph

Two methods are discussed, According to the 1st, the vessel is filled with He at more than 1 atm. pressure and tested with a moving probe connected to the leak detector, Calcn, and estimates are made of the sensitivity of the method and the min. discernible leak. According to the 2nd. method, a sealed small vessel is first introduced into a recipient under high pressure and then placed in an evacuated container connected to a leak detector, the sensitivity of this method is equally discussed.

980-54-151

02070

Geller, R.

Commissariat a l'Energie Atomique (54)

Reasonable Utilization of a Spectrometer
Leak Detector

The general problem of leaks in a vacuum system is discussed. The principles of detection in general and particularly the conditions of detection with spectrometers using He were studied. Pratical applications of a spectrometer leak detector are given.

845-53-151

02080

Geller, R.
Moreau, J.
Ch. Cassagnol

Le Vide 8, 1415-20 (53)

Mass-Spectrometer Leak Detector

A mass-spectrometer with increased sensitivity permitting the use of cheap, impure He has a double spectrometer tube and thus a reduced noise level. The He ions are focused first on a diaphragm and from there on a ion collector. A new ion source has been developed comprising a hot cathode, a grid, a cylindrical anode closed by a diaphragm and an axial magnetic field.

364-53-200

02090

Gemant, A.

J. Appl. Phys. 24, 93-5 (53)

Tracer Diffusion in the Ground in Radio-active Leak Location

The diffusion in the ground of a radioactive tracer gas, used for locating leaks in buried pipes, has been calculated, and the results are presented in the form of graphs. It is shown how the information can be used to obtain the amount of radioactivity needed in a test for both B-emitters and γ -emitters.

364-51-200

02100

Gemant, A.
Hines, E.
Alexanderson, E. L.

J. Appl. Phys. 22, 460-4 (51)

Leak Location by Radioactive Gases in
Buried Pipes

C^{14} labeled Co and Rn were used as tracers; CO_2 was not used because it is readily absorbed by the soil. The principles of the method are described. Suitable techniques for prep. and detecting the tracer gas were worked out. The spreading of a column of tracer gas in a pipe is calcd. Leaks were located on two small-scale installations.

323-43-500
800

02120

Germann, F.E.E.
Gagos, K.A.

Industr. Engng. Chem. 15, 285-6 (43)

Accurate Low-Pressure Gauge

980-57-200

02140

Gibbons, D.
Loveridge, B.A.
Millett, R.J.

Atomic Energy Res. Est. (Harwell) Rep
1/R2208 (57)

Radioactivation Analysis

This bibliography covers the literature which was available to the compilers up to the end of June 1957. 261 references are arranged alphabetically under authors. The subject index is in three parts; (1) reviews and general articles, (2) elements determined, (3) matrices.

086-60-120

02150

Giladi, J.

Chem. Eng. 62, 118 (60)

Sniffer Locates Leaks

The device consists of a light gage pipe containing a fan driven by an air motor, an anemometer and a probe connected to a explosimeter. The suction end of the pipe is placed near the suspected leak and the fan draws the air and any hydrocarbon vapor through the pipe. The explosimeter measures the concentration of hydrocarbon vapors and the anemeter measures the in velocity.

002-54-530

02160

Gilpin, Wm. V.

Am. Gas J. 180 No. 5 28-9 (54)

Southern Union Gas Company Uses New Device
for Finding and Locating Gas Leaks

Description and operation of a sucessful bubble-type leak detector for leaks in gas service lines. The location of the leak can be detd. by addn. of a leak-detecting chemical, such as Me chloride, to the unit. The air picks up a little of the chemical and the presence of the chemical at the location of the leak can be detected by use of a halide lamp and sniffer tube.

375-51-221

02170

Gimenez, C.
Labyrie, J.

J. Phys. Radium 12, 64a-65a (51)

Vacuum Gauge Using Alpha-Rays

Similar in principle to the "Alphatron". The radiation source is Po on Ni and the pressure range 10^{-1} to 10^2 mm Hg. The gauge is particularly useful for corrosive gases and for the estimation of the proportion of a gas in a mixture to two gases. The saturation current varies linearly with the pressure, and results for various gases and for the mixtures Xe-He, A-Ne are shown graphically.

328-62-510

02180

Glassey, E. A.

Instrum. and Control Systems 35 No.2
126 -7 (62)

The Servomanometer

Use of a servo positioner to continuously and automatically measure the manometer column. Allows transmission, recording, or control directly from the servo motor.

524-48-800

02190

Gleneagles Convention

Nature, Lond. 162, 936-7 (48)

High Vacua

The short report on the convention refers to papers on; (1) the scientific aspects of vacuum technique; (2) high vacuum in the paints and plastic industries; (3) high vacuum distillation and dehydration; (4) the application of high vacuum distillation to the processing of triglyceride oil; (5) vacuum metallurgy, and others in (1) scientific applications of high vacua on industrial scale are discussed, and it is suggested that the limit of measurement has in some cases been reached temporarily. (2) explains metallization e.g. shadow-casting for microscopy; hopes recent progress will soon permit separation of molecular species in a pure state. In (3) experience with complex, large-scale plants producing penicillin sera, etc., is presented. Continuous processes, time study, and engineering equipment are described. In (4) increasing use of molecular distillation as a laboratory process is envisaged, though the employment of the process on a commercial scale is shown to be unlikely except in special cases, such as the isolation of vitamin A from fish liver oil. (5) states major advantages in processing metals in vacuo. Large quantities of Mg were produced by a high vacuum technique during the war, Li metal may soon be so produced, production of other metals, (Ba, Cs, and other alkali earth metals) has been studied. Costs are high.

764-44-900

02200

Gluckauf, E.

Trans, Faraday Soc. 40, 436-9 (44)

Simple Analysis of the He Content of Air

A simple app. has been devised to det. He in air with an accuracy of about 1%. The procedure is based on the adsorption behaviour in a gas-adsorptive charcoal tube which had been previously outgassed in vacuo at 4000° for 20 min., and then immersed in liquid N₂. Known mixts. of He and air are used to det. the loss of He during this purification process. Air is found to contain normally 5.24 ± 0.03 p.p.m. of He.

378-58-800

02210

Gluckauf, E.
Kitt G. P.

J. Sci. Instrum V 35 No. 6 220-3 (58)

Leak Testing of Vacuum Plant by Helium
Analysis

An apparatus is described for determining the extent and location of leakages in the operation of gas plants, working at reduced pressures, by the analysis of the rare gases, helium and neon contained naturally in the in-leaking air. It can generally be applied when hydrogen, helium and neon are normally absent from the plant gases. An accuracy of 0.5% for the analysis of a sample of gas containing 0.5 ml of leakage air can be obtained, but it appears that the detection of 0.01 ml of air is the lower limit using a commercial ionization gauge as the sensitive element.

619-46-800

02220

Gluckauf, E.

Proc. Roy. Soc. A. 185, 98-119 (46)

A Micro-Analysis of the Helium and Neon
Contents of Air

The theoretical conditions for the quantitative separation of gases by fractional adsorption are investigated. The micromethod and apparatus for the determination of the He and Ne contents of air by this method are described. The accuracy of the results is discussed especially with respect to the samples obtained from the stratosphere. The most reliable absolute values are: He, 5.239 ± 0.004 ; Ne, 18.21 ± 0.04 parts per million.

619-46-800

02230

Gluckauf, E.
Heal, H. G.
Martin, G. R.
Paneth, F. A.

J. Chem. Soc. 1-4 (44)

A Method for the Continuous Measurement of
the Local Concentration of Atmospheric Ozone

The principle of the method is the liberation of I from buffered KI solution, and its electrometric titration at short intervals with very dilute $\text{Na}_2\text{S}_2\text{O}_3$ solution. The small current resulting from the depolarization of a pair of Pt electrodes by the I is amplified by a 2-stage valve amplifier, and made to actuate the automatic burette, containing the $\text{N}_2\text{S}_2\text{O}_3$ solution, when the I conc. reaches a given value.

980-56-800

02240

Gluckauf, E.
Kitt, G. P.

Atomic Energy Res. Est. Harwell (56)

Leakage Test by the Helium Method

A method for determining the extent and location of leakage by the analysis of the rare gases He and Ne has been further developed as a routine test using automatic control. An accuracy of 0.59 for the analysis of a sample containing 0.5 ccs of air has been obtained, but it would appear that the detection of 0.01 ccs of air is the lower limit for the method using a commercial ionization gage.

378-62-800

02250

Godfrey, G.

J. Sci. Instrum. 39, No. 5 240 (62)

A Simple Pressure Indicator for Vacuum Desiccators

A simple method of assessing the pressure is to enclose in the desiccator a plastic capsule containing a small amount of air which appears inflated under reduced pressure but flaccid at normal atmospheric pressure.

842-56-131

02260

151

Goldbach, G.

Vakuum, Tech. 5, 7 (56)

Leak Detection With Mass Spectrometer and Platinum Diode

The sensitivity obtained for A is superior to that for He in leak detection with a mass spectrometer. The sensitivity of the halogen leak detector (Pt diode) is shown to approach that of the mass Spectrometer with A.

980-50-612

02270

Gol'donberg, S.A.

In vest, Akad. Naub, S.S.S.R. Otdel, Tekh.
Nauk 689-94, 575-81 (50)

Turbulent Transfer In Heat Exchange
Diffusion, and Chemical Processes

The effective coeff, (e) of turbulent transfer in cylindrical tubes is expressed as an empirical function of Reynolds No. (r) such that if U is av. velocity and d is tube diam. $u = (e/Ud) = 0.0009/r^{0.16}$ over the range $r = 4 \times 10^3$ to $r = 10^5$. Above $r = 4 \times 10^5$, u is independent of r.

367-51-800

02280

Gomer, R.

J. Chem Phys. 19, 1072-3 (51)

A Novel Method for the Estimation of
Very Low Pressures

Some zinc phthalocyanine is sublimed on to the W tip of a Muller field-emission electron microscope. The individual molecule of phthalocyanine appears on the screen of the microscope as a four-leaf clover pattern and attention is focused on this until some movement or fluctuation in brightness occurs, when counting is started and the time noted until the next change. From the average time taken and the calculated area of the molecule the no. of impacts per unit time per unit area may be calculated and hence the pressure in the microscope. A set of observations is given.

619-51-144

02290

Goody, R. M
Wormell, T.W.

Proc. Roy. Soc. A 209, 178-96 (51)

The Quantitative Determination of
Atmospheric Gases by Infra-Red
Spectroscopic Methods

New data on the effect of amount of gas, pressure of dry air and temperature upon the 7.8 and 8.6 μ bands of nitrous oxide have been analysed in an attempt to find all the fundamental information required in order to use the 7.8 μ band for the quantitative determination of atmospheric nitrous oxide from telluric spectra. By taking rather more care than has been usual in the measurements of intensity the following conclusions can be reached : (1) It is possible to measure band intensities with a reasonable degree of accuracy. (2) The line broadening in a range of pressures, extending from 1 cm of Hg to 1 atm. of dry air, is caused by a collision process. (3) In this range of pressures, the shape of the wings of absorption lines is well represented by the Lorentz form, (4) The line width at 1 atm. pressure is the same for the 7.8 and 8.6 and the 17 μ bands, and its most probable value is given by $2 \times L - 0.3140 - 0.015$ cm⁻¹. (5) At pressures below 5mm of Hg. Doppler broadening becomes predominant (6) The effect of temperature upon absorption agrees with theoretical prediction, excepting the dependence of collision diameter upon temperature.

980-57-900

02300

Gooderham, W. J.

Chem and Ind. J. 1505 - 7 (57)

Constant - Volume Gas and Volume
Apparatus

The glass app. described contains the best features of existing app.

980-50-610

620

Gratch, S.

02305

Pennsylvania U. Philadelphia, Pa. (50)
Contract N6 onr- 24907

Zero-Pressure Thermodynamic Properties of
Some Technically Important Gases

This report presents definitive values of the zero-pressure thermodynamic properties of the stable, naturally occurring isotopes and the normal isotopic mixtures of the following monatomic gases: H, He, C, N, O, F, S, Cl, A, Br, I and CO₂, diatomic nitrogen, and carbon monoxide. These values were computed by the methods of statistical mechanics and quantum mechanics. The present physical accuracy of all values except for CO₂ is indicated by charts of estimated uncertainties. The calculated values are in satisfactory agreement with those obtained from calorimetric and acoustic velocity measurements in all cases in which the latter are available.

980-56-800

02310

Gray, D.A.

Atomic Energy Res. Est. (Brit) (56)

Nuclear Resonance Detector and Magnetic
Field Stabilizer

1. Atomic power-research-Gr. Brit. 2. Detectors, Ionization-Design-Gt. Brit. 3. Stabilizers- Research - Gt. Brit. 4. Magnetic Fields-Measuring equipment-Gt. Brit. 5. AERE GP/R 1967

524-48-800

02320

Gray, T.J.

Nature 162, 260-1 (48)

Application of Measurements of Semi-
Conductivity to Heterogeneous Reactions

The resistance of semi-conducting cuprous oxide films was measured in presence of various gases (O_2 , N_2 , H_2 , CO , He) at pressures between 10^{-3} and 0.3 mm of Hg. Considerable resistance changes were observed during the corresponding absorption and desorption processes. The measurements are repeatable above 200 C.

980- 520

02330

Greenough, M. L.
Williams, W. E.

U. S. Bureau of Stand. J. of Res. V46 5-6

Mechanical Position Indicator

An instrument has been developed for indicating the position of thin pressure sensitive diaphragms. The electronic instrument gives full scale indication for motions of less than 5×10^{-4} in. Five tubes are incorporated in a circuit based upon the principle of mutual inductance micrometer for the detection of diaphragm motion.

684-47-510

02340

Gregg, J. R.

Rev. Sci. Instrum. 18, 514-15 (47)

A Microrespirometer

A simple constant-volume instrument designed for the measurement of gas exchanges of from 0.001 to 0.5 mm³ is described. The results of some measurements of O uptake by minute living organisms are presented, advantages of the design are pointed out, and the possible applications to general microrespirometry are indicated.

368-54-153

02350

Griffiths, J. H.
Phillips, C.

J Chem. Soc. 3446-53 (54)

Gas Chromatography

The method involved is the chromatography of gas and vapors and applications of the surface potential detector. The device consists of 2 identical metal plates connected by a conductor. One plate can be made to vibrate by an oscillator. If the plates are different in surface treatment, an alternating EMF will occur when the plate is vibrated which can be measured by applying a bias EMF to one of the plates. If the surfaces are changed by exposure to an adsorbable vapor, the potential will be altered and this change can be amplified and read. Here they use N as a vehicle for the gases to be analyzed. The apparatus features high sensitivity i. e. 4 p.p.m. of ethyl oxalate in N₂ gives a signal of 7.5 mv.

367-46-620

02360

Grilly, E. R.
Taylor, W. J.
Johnston, H. L.

J. Chem. Phys. 14, 435-40 (46)

Accommodation Coefficients for Heat
Conduction Between Gas and Bright
Platinum for Nine Gases Between 80° K
and 380° K

Accommodation coefficients for O_2 , NO, CO, CO_2 , N_2O , CH_2 , H_2 , and He are computed from the $(1/K_a)$ v. $(1/P)$ slopes of thermal conductivity measurement. The results are tabulated and collected in a graph for comparison with other results. Hydrogen rises towards a coefficient of unity with lowering temperature, but other gases drop steeply at low temperatures. The values differ slightly from Knudsen accommodation coefficients. Equations are derived which give the relationship between the reciprocal slopes the temperature jump constants g and the accommodation coefficients.

997-58-620

02370

Groenig, H.
Weymann, H.D.

Contract, AF 61 (514)1046 (58)

Measurement of the Boundary Layer
Thickness and Relaxation of Ionization
Behind Strong Shock Waves with a New
Capacitive Probe

This report deals with the measurements of the thickness of the boundary layer with a capacity probe. This probe flush inserted into the wall of the shock tube and thus avoiding any disturbances in the flow is sensitive to the thickness of the boundary layer, when the gas in the undisturbed flow is ionized. The experimental results for argon at Mach numbers between 5 and 10 show the usefulness of the probe for measuring the thickness of the boundary layer, the relaxation time of ionization and the coefficient of diffusion. The experiments were carried out in argon because high Mach numbers could be achieved in argon even with a small shock tube.

Glas-u. Hockvakuum - Tech 2, 302-6 (54)

Gruber, H.

Technical Pirani Gage With Heating Resistors

Vacuum gages for pressures between 10^1 and 10^{-3} mm Hg can be made with small thermal capacity heating resistors following the principle of the Pirani gage. The sensitivity essentially depends on the temp. coeff. of the resistor. Suitable are thermistor-type semiconductor beads with a neg. temp. coeff. of about $1/4$ cu. mm. vol. This bead has Pt alloy leads about 5mm. long and 0.005 mm. thick. The temp. coeff. is between 3% and 4.5%/° and total resistance is either 1000-3500 ohms or 100-350 kilo-ohms with 20% tolerance. The stationary state is reached at current passage after about 25 sec. and should not change for more than 0.3% after 1500 hrs. continuous load at 110°. The compensation resistor should be in air under atm. pressure. The bridge is fed with d.c. from a transformer-rectifier type power supply, which can be stabilized with a gas voltage stabilizer tube and can be checked with moving-coil instrument. With increasing heating current intensity the calibration curve shifts to higher pressures, because at low pressures, the sensitivity is higher, the smaller the heat losses are through conduction in the leads plus radiation as compared to the losses through convection in the residual gas; moreover, the temp. coeff. of heating resistors is in first approx. proportional to $1/T^2$. Therefore, heating currents should be chosen as low as possible without falling under the disturbing influence of room-temp. variations. A compromise is 1-2 ma. heating current. The heat conduction through the leads must be smaller than the radiated heat. In com. thermistors, the leads are too long and too thick. With specially prepd. NTC-resistors, the calibration curve can be shifted to lower pressures, and linearity is obtained over a large pressure range. Above 10^{-2} mm Hg. the curve is practically identical with the calibration curve of the thermoelec. vacuum gage. Above 0.5 to 4mm Hg. the thermistor gage is much more accurate; here, com. thermistors are more favorable. Conventional heat convection gages undergo changes through surface change by pump oil and carbonization. In this respect, the NTC-gage is superior to other heating resistor gages. No changes have been observed; the service temp. being below 70°, and the surface of the semiconductor being less important as to its definition. Influence of room-temp. changes is inadmissibly great with NTC-resistors of the $1/T^2$ dependence. Therefore, both resistors must be mounted in a common brass tube side by side to assure temp. equality. This way, at low pressures, an accuracy of 4% is assured, for industrial measurements sufficiently precise. The temp. of the brass tube should not change by more than 5°. Water cooling not being practicable, a solution has been found in the combination of resistors with pos. and with neg. temp. coeff. of resistance. Fe and Ni are appropriate as pos. temp. coeff. resistors. Several possibilities for obtaining compensation are explained. After service during one year, no aging could be observed. This is an essential advantage against the thermoelec. gage which ages sometimes after a few weeks. In order to obtain the same final reading, generally, the tube is being overheated, which is fatal to the tube and very often

Gruber, H.

Glas-u. Hockvakuum-Tech 2, 302-6 (54)

Technical Pirani Gage With Heating Resistors

to the expensive mv-meter. Final reading is obtained in less than 25 sec. with the NTC-gage and in about 40 sec. with the thermoelectric gage. The NTC-gage can be permanently kept under current and shows 95% total deflection after 2-3 sec. At pressure changes, the instrument adjusts itself within about 5 sec. Power requirements is about 2 w. against 10 milliwatts of the conventional Pirani gage. The heating-resistor vacuum gage shall be further developed to a leak detector and to a vacuum switching relay by means of electronic switching elements.

Gucker, F.T.
Peterson, A.H.

J. Colloid Sci. 10 No. 1 12-23 (55)

A Comparison Photometer to measure Light Scattering of Aerosols and Gases, Using the Latter as Light-Scattering Standards.

Describes, the design and operation of an extremely sensitive instrument for automatic measurement of light scattered from aerosols is determined by the scattering from the air molecules in which the particles are dispersed. The scattered light and a suitable attenuated portion of the direct light fall successively upon a photomultiplier tube, the anode current of which passes through a high resistor to give an IR which is measured in a comparison voltmeter. The high voltage supply of the photomultiplier is adjusted to give a constant IR drop with the attenuated direct light on the photomultiplier, so, as to compensate for changes in the photomultiplier sensitivity and largely offset changes, in the lamp brightness. If the scattering due to the air is maintained constant, the lower limit of measurement can be reduced to the background noise, which is about 1-5% of the air scattering. This corresponds to the light scattered by a sample containing about 3×10^{11} g/l of a dioctyl phthalate aerosol of 0.3u. diameter. Since the instrument is sensitive to the molecular scattering due to gases, they may provide a convenient scattering standard for aerosol measurements, which can then be expressed as the ratio of the light scattering of the aerosol to that of the standard gas. Since gases vary widely in their light-scattering ability, such measurements also would find application in gas analysis.

980-52-140

02400

147

150

Guerin, H.

Bull. Soc. Chim. France 19, 24-33 (52)

Modern Methods of Gas Analysis

A resume of existing methods. The principal physical methods dealt with are selective diffusion of the constituents of a mixture, fractional desorption and distillation at const. pressure, thermal, electrical conductivity and magnetic susceptibility measurements of mixtures, on measurements of the heat produced on absorbing gases in solvents and on absorption and mass spectroscopy.

165-50-700

02410

Guthrie, A.

Electronics, 23, 96-101 (50)

Leak Detectors for Industrial Vacuum Systems

The main desiderata for such detectors are: (1) capability of measuring total leakage and isolating individual leaks; (2) rapidity in response; (3) high sensitivity; (4) adaptability to any vacuum system without loss of vacuum; (5) relative simplicity and low cost; and (6) selectivity. Of eight tabulated methods, the He leak detector is generally the most useful for rapid operation. It is based on the vacuum analyser, a form of small-radius mass spectrometer. It consists of a non-magnetic tank, supported by and connected to the vacuum line, and in it are mounted a cold cathode positive ion source, a collector, and a magnet system. A sweep voltage superposed on the ion-accelerating voltage sweeps the He mass peak across the collector slot. The collector is connected through an amplifier chain to (1) a.c.r.o. with horizontal sweep in phase with the other sweep voltage, (2) a leakage-detecting meter following a filter for removing all frequencies except the sweep frequency, and (3) a 1 kc/s "Squealer" circuit. Leak sensitivity - 1 part of He in 2×10^5 parts of air and is limited by noise in the amplifier, stray frequency pick-up, and ion background. Methods of determining sensitivity are described and response time discussed. The whole procedure of searching for leaks and their subsequent repair is explained in detail.

997-58-300

02420

Haas, E.C.

N.Y. Naval Shipyard (58)

Report of Development of Water Indicating
Paste for Use at Elevated Temperatures

This report covers the development of a water indicating paste for use in detecting leaks in pressure vessels at temperatures up to 500°F. The formula developed has been laboratory tested to show that it reacts with hot or cold water to give a clearly discernible permanent color change and is essentially unaffected, in its water indicating properties, by 300 hrs. at 500°F or 300 hrs at 100% relative humidity at ambient temperatures, and meets general requirements for an easily applied, adherent, non-corrosive coating. The formula consists of equal parts of silver chromate and lead chloride mixed with sufficient thinned, phenolic-base spar varnish to give a smooth paste of desired consistency.

999-60-153

02430

Haber, H.S.
Gardiner, K.W.

Bell and Howell Res. Center (60)

Electroanalytical Method for the Determination of Carbon and Hydrogen in Organic Compounds

The development and application of a rapid C-H analyzer is summarized. A prototype instrument was developed combining electro-analytical and gas chromatographic techniques. Ten minutes are required for a complete analysis. Additional refinement of the apparatus will be necessary to attain the specified accuracy of 0.3% by weight.

964-60-151

02440

Habfast, K.

Zeit fuer Instrumentenkunde v68 No. 4
82-6 (60)

Präzisionsbestimmung von Isotopenhäufigkeit
mit dem Massenspektrometer

Accurate determination of isotope ratios by mass spectrometer; new electronic circuit makes it possible to measure ratios with absolute sensitivity of better than 1:10⁹; features of new dual collector system.

980-55-140

02450

Haefer, R.

Acta, Phys. Austriaca V9 No. 3-4 200-15 (55)

Methods for Measuring Low Gas Pressures by
Means of the Automatic Gas Discharge in
a Transverse Magnetic Field

Four methods of determining low gas pressures by measuring magnetic and electric variables are investigated. Applicability, advantages, disadvantages, sources of error and methods, separately or combined, have a measuring range of 10^{-1} to 10^{-8} mm Hg.

997-61-112

02455

Hafner, A.

Naval Res. Lab. Washington, D. C. Rept No.
5647

A Portable Thermistor-Bridge Gas Leak
Detector

A new portable gas leak detector useful for locating leaks in pressurized systems containing any gas having a thermal conductivity different from that of air is described. The detector is accoupled and hence does not respond to the gas concentration in the ambient air but only to the change in concentration encountered in the vicinity of a leak. Investigation and experiments led to a choice of a thermistor bridge in which optimum response time and minimum sensitivity to gas flow rate variations is obtained by using thermistors shielded from the turbulence of the direct gas flow by glass envelope to admit the gas by diffusion. Care was taken in the circuit design to prevent blocking of the high-gain amplifier by noise. Sensitivity of the gas leak detector was checked against a calibrated leak of Freon-12, and the device proved to be useful in locating Freon F-12 leaks of as small as 2 oz per yr.

980-53-800

02460

Hanlein, W.

Glas-u Hochvakuum-Tech 2, 279-84 (53)

High-Vacuum Ovens With Resistance Heating

Resistance heating, rather than inductive or elec.-arc heating, is recommended for good heat distribution within the oven and accurate temp. control. Materials used in the heating elements can be alloys such as Nichrome or Megaphyr for temps. up to 1300°, Mo up to 1800°, and W or graphite above 1800°. Oven housings, thermal insulation, vacuum pumps, diffusion pumps, leak detectors, etc. are discussed. Elec. circuits and cross-sectional diagrams of the oven are shown.

043-40-162

02470

Hailwood, A. J.

Brit. 520-504 (40)

Fuel Gases

Leakage of gases contg. toxic components can easily be detected by adding to the gas a suitable proportion of the vapor of heptaldehyde or of the crude enanthal-contg. distillate from the destructive distn. of castor oil.

004-61-100

02480

Hall, H. L.

Analyt. Chem 37 No.1 (61)

Quantitative Gas-Solid Chromatographic
Determination of Carbonyl Sulfide of a
Trace Impurity in Carbon Dioxide

Carbonyl sulfide at the parts per million level in carbon dioxide has been determined linearly over the investigated range of 0.5 to 2600 p.p.m. Minimum detectable concentration under these conditions is 0.3 p.p.m. with an estimated uncertainty at the 3 p.p.m. level of ± 0.07 p.p.m. The method is rapid and reliable and has been successfully applied to the determination of carbonyl sulfide in commercial carbon dioxide which produced carbonated water having off-taste and off-color.

684-46-133

02490

Hamacher, E.A.

Rev. Sci. Instrum 17, 281 (46)

An Automatic Ionization Vacuum Gage and
Monitor

The instrument described embodies a Western Electric Co's D79510 vacuum tube manometer and an audio-frequency monitor. The audio-frequency monitor comprises a multivibrator oscillator, the frequency of which is a function of its bias, coupled into an intercommunication system. The bias voltage is obtained from the cathode of the vacuum tube voltmeter of the manometer. Leak hunting consists of connecting the audio monitor to the intercommunication system, and bathing the suspected parts of the vacuum system in ether. A sharp increase in the frequency of the signal occurs when the ether enters the leak.

241-44-160
400

02500

Hambright, W.B.

Gas Age 94, 16, 50, 52, 54 (44)

Leakage Control

Outline of methods: odorization, humidification and rehydration, systematic bar testing of amins, surveys with listening devices.

684-57-111

02510

Hamilton, A.R.

Rev. Sci Instrum V28 No. 9 693-5 (57)

Extended Range Thermal Conductivity Vacuum Gauge

Two magnetic-amplifier circuits for automatically controlling a constant-temperature hot-wire vacuum gauge are described. The differential circuit senses temperature variations by means of voltage and current control coils which respond to the ratio of voltage to current in the hot wire. The bridge circuit senses temperature variations by unbalance in a Wheatstone bridge circuit. In either case, the sensing signal is amplified and fed back to the hot wire in such a direction as to very nearly restore the original temperature.

997-61-151

02520

Hammond, G.L.

Naval Ord. Lab White Oak (61)

Thermal Emission Spectra From the Nol Adiabatic Compressor

The thermal radiation emitted from rapidly compressed monatomic gases in the NOL Adiabatic Compressor was spectrographically analyzed, and shown to be the spectra of vaporized components of the compressor. Experiments to introduce and to excite selected emitters in the compressor were successful, whereas experiments to eliminate the radiation from the vaporized compressor components met with only partial success. Effects due to collisions of the emitting atoms with perturbing atoms were observed in the radiation; namely, the lines are broadened, shifted, and exhibit asymmetric intensity profiles. Measurements of the shift of some lines as a function of relative density of the perturbing gas are presented and observations of diffuse, satellite bands on the short wavelength side of some of the atomic lines are reported.

980-56-170
200

02530

Hanle, W.
Kugler, I

Optica Acta V3 No 3 131-8 (56)

Radio Luminescence as Constant-Intensity
Light Source

A study is made of the problem of establishing sources of light by the combination of a radioactive material with luminescent materials. The principal difficulty arises from the gradual destruction of the luminescent material by the high energy of the radiation. Combinations of radioactive and luminescent materials are given which make possible the establishment of sources of an intensity which is constant though rather weak.

684-48-151

02540

Hanley, T.E.

Rev. Sci. Instrum. 19, 369 (48)

The Use of Thoria-coated Filaments in the
Mass-Spectrometer Leak Detector

The life of a W. filament in a mass-spectrometer leak detector is increased 10 fold by coating with thoria. The filament is made the neg. electrode for a few sec. in a coating bath contg. 100 ml 95% Et OH, 5g. 200-mesh fused thoria, and 0.075 g. thorium nitrate. At an initial c.d. of 75 ma. sq. cm and voltage of 100 v. a 0.001 - in coating forms on a 0.005-in wire in 2 sec.

684-56-133

02550

Hariharan, P.
Bhalla, M.S.

Rev. Sci. Instrum V27 No. 7 448-9 (56)

Simplified Ionization Gauge Circuit with
Logarithmic Pressure Scale

The control circuit described utilizes a logarithmic difference amplifier to measure the ratio of the positive ion current to the electron current drawn by the gauge. This eliminates the necessity of stabilizing the electron current within close limits and permits direct readings of pressures ranging from 10^{-3} to 10^{-7} mm of Hg on a single logarithmic scale.

524-56-153

02560

Harley, J.
Pretorius, V.

Nature, 178, 1244 (56)

A New Detector for Vapor-Phase Chroma-
tography

The detector consists of a small platinum disk cathode and a tungsten wire anode forming one arm of a Wheatstone Bridge. The bridge is balanced with carrier gas flowing through the detector at a pressure sufficiently low to produce a normal glow discharge between the electrodes. Compounds eluted from the column cause a voltage change across the detector which is measured by a recording potentiometer.

094-59-153

02570

Harris, W.E.

Chem in Can 11 No. 7 817-35 (59)

Gas-Liquid Chromatography

A review with 34 references.

Hartmann, S. R.

Wright-Patterson A. F. Base (57)

Theoretical Analysis of the Response of
Proton Recoil Type Neutron Detector

A calculation is made to determine the number of recoil protons produced per unit area, by a neutron flux of arbitrary energy, in an infinite hydrogenous slab which reaches but does not pass through an infinite detector slab located immediately behind a hydrogenous slab. A general case is considered for an isotropic neutron flux incident upon the above system in which an arbitrary thickness of some proton absorbing material separates the hydrogenous and detector slabs. A discussion of the results is given indicating how one can control the energy and the energy interval over which the system is sensitive to neutrons. A final calculation is made to determine the response of the system to a collimated neutron flux for an arbitrary orientation of the hydrogenous-detector system. This is done so that the effect of a nonisotropic flux can be determined.

601-47-154

02590

Hartwig, H.H.

Paper Trade J. 124 No. 20 47 (47)

Method of Locating Points of Gas Leakage
in Package and Packaging Materials

A cell is constructed with the test sheet or package which permits introduction of H_2S gas under slight pressure. The outside of the cell is brushed or sprayed with $SnCl_2$ solution. Ruptures or openings are located by brown stains resulting from the reaction of H_2S and $SnCl_2$. This method is useful in determining at what point during conversion or package construction, voids and openings appear.

364-57-153

02600

Haslam, J.
Jefferies, A.R.

J. Appl. Chem 7, 24 (57)

Gas-Liquid Chromatography in a Plastics
Analytical Laboratory

Procedures are described for the application of gas-liquid chromatography to the determination of impurities in monomeric Me methacrylate, to the examination of depholymerization products obtained from polymers, and to the identification of solvents in polymeric adhesives.

561-58-153

02610

Hausdorff, H. H.
Brenner, N.

Oil Gas J. 56, 73-5 (58)

Gas Chromatography

The qual. aspect of gas chromatography is expressed as retention time, retention ratio, or retention vol. The method is rendered quant. by means of internal normalization, internal standard, or peak-height calibration. Three analysis techniques are discussed, and possible uses of gas chromatography to obtain fundamental phys. and chem. data are outlined.

684-50-421
540

02620

Havens, R.
Koll, R.
La Gow, H.

Rev. Sci. Instrum. 21, 596-8 (50)

A New Vacuum Gauge

The gauge works on the principle of obtaining an a.c. signal from a normally d.c. pressure gauge by cyclically changing the pressure at a given frequency. In the model described, two bellows, one containing a Pt ribbon and the other a W wire, are connected to the vacuum by 1mm holes, and driven by a motor to alter the pressure by 20% per cycle. The wires are heated by electric currents and the a.c. difference potential taken to an amplifier. The gauge is robust and covers a range of 1 atmos. to 10^{-5} mm Hg.

Haywood, J. T.

U. S. 2,280,086 Apr

Detecting and measuring the Gas Content of
Mud Fluid Such as Used in Drilling Oil
and Gas Wells

App. is described and a method is employed which involves subjecting the gas-contg. liquid to 2 different pressures, at least one of which is subatm. measuring the elec. specific resistivities of the liquid at such pressures, and detg. the gas content of the liquid from the difference in such specific resistivities.

881-51-146

02640

Hazey, G.

Water and Sewage Works 98, 382-4 (51)

Leak Detection on Sub-Aqueous Row Water
Intake Line

Description of how leakage of 42" idiameter sub-Aqueous concrete pipe in Wyandotte, Mich, was located by using 12 tons of salt and an impedance bridge.

365-59-147

02650

Head, V.P.

J. Basic Eng. 81, 660-8 (59)

Electromagnetic Flowmeter Primary Elements

An obstructionless flowmeter for elec. conducting liquids is described, Tentative design inspection criteria which have been found to provide accuracies of $\pm 0.5\%$ or as little as $\pm 0.1\%$ ft/sec pipeline velocity are set up. A practical threshold cond. of meterable liquids is set at 20 umhos per cm. though there is every reason to expect that this will be reduced. Above this threshold, the flow coeff. in the vol.-rate equation is shown by tests to be independent of the cond., of the Reynolds no., and of installation conditions.

980-52-133

02660

Heath, H.

Capenhurst Work (Eng) (52)

Initial Experience with the Palladium-ion
Gauge Method of Vacuum Testing

A thin heated Pd sheet between an ion gauge and a vacuum chamber allows H₂ exclusively to enter the ion gage. Thus, a leak probed with H₂ shows up even with heavy outgassing and with short pumping times. Operation of and operating experience with such a test arrangement are described.

997-59-130

02670

Hecht, G.J.
Laderman, A.J.

Berkeley AF 49(638)166 (59)

On the Development of Gaseous Detonation

The design and construction of an ionization detection circuit to measure ionization world lines during the development of detonation is described. The ionization processes occurring in flames, shocks, and detonations are reviewed. A critical survey of existing ionization gauges is made. The evaluation of performance criteria for the present purpose is described and the design of the gauge and electronic apparatus reported. The operation of the instrument is demonstrated by means of experiments performed with stoichiometric hydrogen-oxygen mixtures. It appears that the apparatus is a reliable and sufficiently accurate instrument for the measurement of ionization world lines during the development of detonation and that it can be adjusted so that within most of the operating range it registers the world lines of the flame front.

980-42-151

02680

Henneberg, W.
Bruche, E.

Arch. Tech. Messen. 138 T133-4 (42)

Concepts and Notations in Geometrical
Electron Optics

Review of the basic concepts of geometrical electron optics including the mass spectrograph from the point of view of graphical representation. Notation and definitions are critically discussed.

845-59-800

02690

Henry, R.P.

Vide No. 82 V14 226-40 (59)

Measure de la vitesse de Degazage par une
Methode due a Oatley

Measurement of speed of outgassing by method of Oatley; achievement of primary vacuum, exclusive of influence of products of outgassing depends on pumping speed and capacity of system; article describes investigation of effect of evolution of gases from surfaces of evacuated volume as limiting and controlling factor in speed and attainment of secondary, or high vacuum; equations, graphs, and other data.

245-60-600

02700

Herning, F.

Gas- u. Wasserfach 101, 197-204 (60)

Developments in Gas Measuring Techniques
by the Ruhrgas A.G.

Various types of gas meters, such as the rotary; orifice, "screw wheel" etc. are discussed as well as means of measuring gas demand. A new hand-operated form of gas d.app. is described and illustrated. Lab development has been carried out on app. for recording H_2S and moisture concns. and gas chromatography has been found useful for establishing the exact nature of the C_2 , C_3 , and heavier hydrocarbons in gas. Recording calorimeters have also been improved.

524-52-130

02710

Hersch, P.

Nature, 169, 792-3 (52)

Galvanic Determination of Traces of Oxygen
in Gases

Cathodic reduction of oxygen is investigated in connection with gas analysis, for which purpose cathodes half-immersed in the electrolyte under N_2 and H_2 are used in suitably designed cells. It is found that otherwise difficult detectable traces of O_2 in the gas phase such as 10^{-6} ml/ml are capable of giving substantial and easily measurable currents. Manipulation details are given, and with the cell described, O_2 or high-purity N_2 is rapidly determined with an uncertainty of 0.00005%.

801-57-155

02720

Hershberger, Wm. D.

R. C.A.U.S. 2,792, 548 (57)

Gas Analysis by Use of Microwaves

The analysis of gases is carried out by detd. of selective absorption, variation in idelec. const. at const. pressure, or as a function of pressure, formm. or c, . electromagnetic waves. The procedure has been applied to the monitoring of the production of NH_3 by the Haber process. The effect of gas pressure on microwave absorption is detailed and derived, so that an optimum pressure or pressure range can be selected for the particular analysis.

323-55-530

02730

Hettinger, F.C.
Hoelscher, H.E.

Ind. Eng. Chem. 47, 2437-9 (55)

Gelatin - Bubble Method of Leak Detection

The gelatin bubble method and Agar-agar film method are used to detect air in gelatin and CO_2 in agar-agar. The two procedures are outlined and 6 methods that were studied and rejected.

997-53-151

02740

Heywood, W.A.

Knolls Atomic Power Lab. Contract W-31 (53)

Static Seal Studies

Helium leak rates were determined by a mass spectrometer method for a static seal using Koroprene, Neoprene type TR, and Hycar square-cross-section seal rings and a standard "O" ring having a circular cross section. The pressure drop across the seal was 65 psi in all cases. Leakage values ranged from 7×10^{-2} cc/min for the Koroprene ring to 2.7×10^{-5} cc/min for a Hycar seal ring in a specially designed groove. These leak rates are of the same order as would be expected from diffusion of He through the elastomer. These values can be compared with leak rates obtained by metallic For example, the leak rate of a $7 \frac{1}{8}$ in diam gasket made of 64 mil-diam. Al wire was found to be of the order of $2 \times 10^{-}$ cc/min. .

965-54-133

02750

Hiby, J. W.
Pahl, M.

Z. Naturforsch, 9a No.10 906-7 (54)

Compensated Ionization Gauge for Vacuum
Measurements of High Relative Accuracy

The advantages of a bridge circuit which eliminates variations in the emission current are described.

524-60-800

02760

Hickman, K.

Nature V187 No. 4735 405-6 (60)

Pump Fluids for Higher Vacuums

Report on use of some phenoxy benzenes and polyphenyl ethers as high vacuum fluids in range of 10^{-8} to 10^{-10} mm of Hg in large containers.

364-60-151

02770

Hickmott, T.W.

J. Appl. Physic. V31 No.1 128-36 (60)

Interaction of Atomic Hydrogen with Glass

Omegatron ion resonance mass spectrometer has been used to study residual gases in ultra-high vacuum system; atomic hydrogen reacts with glass to produce contaminant molecules, CO, H₂O and CH₄; quantitative measurements of binding of atomic hydrogen by glass show existence of two distinct binding sites of nearly equal population; means of minimizing effects; pertinence to vacuum techniques.

980-51-200

02780

Hill, L.W.

Atomic Energy Res. Est. (Harwell) (51)

Development of a Method of Detecting Leaks
in the Sheathing of Telephone Cables by the
Use of Radioactive Materials

Development of a method of detecting leaks in the sheathing of telephone cables up to the point at which extensive field trials are necessary is described. The choice of radioactive materials is limited by various factors to two substances. The use of the more convenient of these is examined experimentally. Results indicate that the technique is at least as sensitive as and much quicker than the method at present in use in which air is pumped into a cable and the fall in pressure after a given time is measured.

684-45-151

02790

Hipple, J.A.

Rev. Sci. Instrum 16, 69-75 (45)

Grove, D.J.

Hickam, W.M.

Electronic Problems Involved in the Practical
Application of the Mass Spectrometer

A mass spectrometer is described that incorporates several electronic devices to ensure speed and accuracy in the analysis of gaseous mixts. So that the ion beam may be steadily focused on the exit slit the accelerating voltage is kept const. to a part in several thousand and the deflecting magnetic field is regulated to still higher accuracy. For scanning the masses the field is varied with input currents of 10 to 110 ma. while the ion voltage is fixed at 600v so that the spectrometer and its assocd. power supplies may be operated on low voltages. In the recording system an L and N Speedomax recorder has been adapted for use with an amplifying system for the ion current that is faster than the recorder itself; and the accuracy of the recorder is increased by use of a nonlinear scale and an automatic range change. For correct identification of the masses corresponding to the registered peaks a mass marker was devised to measure the field in the gap of the deflecting magnet.

609-45-151

02800

Hipple, J. A.
Condon, E. U.

Phys. Rev. 68 54-5 (45)

Detection of Metastable ions With the
Mass Spectrometer

609-46-151

02810

Hipple, J. A.
Fox, R.E.
Condon, E. U.

Phys. Rev. 69, 347 (46)

Metastable Ions Formed by Electron
Impact in Hydrocarbon Gases

Study of non-integral masses in mass spectra of various hydrocarbons using mass spectrometer. Notes difference in operation of mass spectrometer with ion source grounded and with analyzer grounded.

980-57-150

02820

Hippel, von, A.

Mass. Inst. of Tec. Cambridge

Progress Report No. XXI

Progress is reported on dielectric spectroscopy, excitation, conduction and breakdown, spontaneously organized dipole systems, single crystals and ceramics.

762-49-624

02830

Hirschfelder, J. O.
Bird, R.B.
Spotz, E.L.

Trans, Amer. Soc. Mech. Engrs. 71,
921-37 (49)

Viscosity and Other Physical Properties of
Gases and Gas Mixture

A comprehensive review of the theorethical tools available for the calculation of the thermodynamic properties of gases and gas mixtures at finite, moderate pressures. Reviews information collected during the past two decades and shows the extent to which it can be correleated and systematized by means of molecular theory. The paper outlines a new method of formulating and predicting the viscosity and other transport properties of gases and gas mixtures at sufficiently low pressures. Extensive tables illustrate the method so that the user is enabled to calculate the viscosity and other transport properties of a large class of technically important gases and gas mixtures with very little labour.

980-56-900

02840

Hix, P.

Slaboproudy Obzor V17 No. 12 727-35 (56)

Some News from the Field of Vacuum
Technology in Czechoslovakia

Gives a fairly detailed description of the following items; (1) fractionating oil diffusion pumps operating with a fore vacuum of 0.5 mm Hg and producing a final vacuum of 5×10^{-7} mm Hg; pumping speeds of these advices range from 10 to 1200 litres per sec; (2) high vacuum calces; (3) a Penning gauge for vacua of down to 5×10^{-7} mm Hg (4) an ionization gauge for vacua down to 10^{-6} mm Hg (5) a leak detector based on a Pd tube; (6) the properties of some Czechoslovak diffusion-pump oils and (7) an instrument for measuring vapor pressure of the diffusion oils.

373-58-153

02850

Hobden, F.W.

J. Oil and Colour Chemists Assoc. 41, 24-41 (58)

Gas-Liquid Chromatography and its Application to Paint and Allied Industries

A review of the principles and techniques of gas-liquid partition chromatography, with a discussion of applications in the paint industry. The techniques can be used for the control analysis of solvents in nitrocellulose colns. the detn. of solvents in a mixt. of unknown compn. and acrylic resins.

378-56-142

02860

Hobson, H.
Kay, R.H.

J. Sci. Instrum V33 No. 5 176-81 (56)

Two Designs for a Paramagnetic Oxygen Meter

A robust oxygen detector capable of giving direct readings on a meter or recorder has many applications in physiology or in the control of chemical processes. Physical methods at present available commercially have characteristics which often make them unsuitable for particular applications. This paper describes two separate but parallel investigations of the design of an oxygen meter depending on the paramagnetism of oxygen and the change of its susceptibility with temperature. One instrument covers 0-100% oxygen concentrations at or near atmospheric pressure, the other 90-170 mm of Hg partial pressure of oxygen in total ambient pressures of about 600-900mm of Hg.

002-63-421

02870

Hogan, D.P.

Am. Gas J. V190 No. 2 30-3 (63)

Sonic Pinpointing of Leaks

A detector is described which uses the principle that sound present in the gas stream inside a pipe will issue from a leak along with the escaping gas. A 50 watt, 400 cycle generator is used to supply the source of the sound waves. The signal at the leak is compared with the signal at the transmitter by means of a radio link.

605-48-140

02880

Hogarth, C.A.

Phil Mag. 39, 260-7 (48)

The Variation with Vapour Pressure of the Properties of Certain Electronic Semi-conductors

Formulae are given for the variation of the Hall effect and the thermoelectric power. The agreement with experiment is good.

103-41-146

02890

Huguenard, M.E.

Compt. Rend. 213, 21-3 (41)

Electrical Method for the Instantaneous Determination of Traces of Gas in Air

Changes in the compn. of air are detd. by changes in the resistance of a Pt wire heated to 1200-1300°. CO, H₂S, H₂, NH₃, alc., ether and illuminating gas cause exothermal reactions and thereby increase the resistance. CO₂, H₂O and CCl₄ dissociate, cool the wire and thus decrease the resistance. An app. is sensitive to 1 p.p.m. of CO₂ in air. The nature of a foreign gas or of a mixt. can be detd. from its behavior on a Pt wire when heated to various temps.

378-51-620

02900

Honick, K.R.

J. Sci. Instrum. V28 140 (51)

Mercury Monometer

A null method mercury cistern manometer. This instrument was designed for the calibration of aircraft instruments such as airspeed indicators and altimeters. It may be adapted to a general laboratory and workshop application where a robust and relatively inexpensive transportable standard is required for precision measurement of pressures within 1 atm.

378-62-153

02910

Hook, D. W.
Mable, S.E.R.

J. Sci. Instrum 39 No.5 214-6 (62)

A Compact Cathode-Ray Tube Gas Chromatograph

A compact cathode-ray tube display gas chromatograph has been constructed for the routine analysis of anaesthetic vapours or similar volatile materials. The analysis is performed by a stainless steel capillary column feeding into a micro-argon detector. The chromatogram is displayed on a six inch square long persistence cathode-ray tube. A pneumatic gain control and a separate timing channel are provided.

The instrument would be of use with suitable modification in industrial and research applications for the rapid analysis of vapour mixtures. The instrument is compact and portable and permanent recording can be made if desired.

801-800

02920

Hopkins, H.H.

Nat. Carbon U.S. 2,171,113

Apparatus for Detecting Leakage of Internal-Combustion Engine Gases, Etc.

Various structural and operative details.

042-57-153

02930

Horn, O.
Schwenk, U.
Hachenberg, H.

Brennstoff-Chem 38, 116 (57)

Gas Chromatography

Principles of gas chromatography are discussed. A com. instrument for use with the method of Janak. is discussed.

042-58-152

02940

Horn, O.
Schwenk, U.
Hachenberg, H.

Brennstoff, Chem 39, 336-46 (58)
Gas Chromatography

An instrument with 4 exchangeable columns is described. Analysis of hydrocarbon mixts with up to 30 components is possible; each component can be detd. in the range of 0.01-99.8 vol%.

980-51-610

02950

Horning, D.O.

Berkeley, (51)

Vacuum Vessel Construction Techniques and
Sealing Methods

This is Appendix 1 to a thesis on "The mechanical design, construction, instrumentation and operation of a low density supersonic wind tunnel". This thesis presents engineering problems associated with such a wind tunnel for studies of rarefied gas dynamics.

801-45-151

02960

Hoskins, E.E.
Langmuir, R.V.

U.S. 2,386,609 (45)
Mass Spectrometer

801-45-151

02970

Hoskins, E.E.

U.S. 2,374,205 (45)
Mass Spectrometer

845-60-151

02980

Huber, W. K.
Trendelenburg, E.A.

Vide VI5 No.86 132-9 (60)

Development Recent des Groupes a Ultra-
Vide Utilisant des Pompes a Diffusion

Development of ultra high vacuum systems using oil diffusion pumps modified Alpert type high vacuum system connected to mass Spectrometer; main constituents of residual atmosphere were H_2 and CO ; pumping system using rotary pump, 120 l/sec diffusion pump and 650 l/sec diffusion pump, followed by baffle and liquid air trap arrangement enabled vacuum of 10^{-9} mm Hg to be maintained 2 weeks without refrigerating air trap.

526-51-150
212

02990-

Hudgens, J.E.
Benzing, R.O.
Cali, J. P.
Meyer, R. C.
Nelson, L. C.

Nucleonics 9 14-21 (51)

Determination of Radium or Radon in Gases
Liquids or Solids

Nitrogen is bubbled through a solution containing a weighed amount of the test sample to remove all the radon. The nitrogen radon is taken into an evacuated ionization chamber after passing through a purifying system to remove water and acid vapours, oxygen and CO_2 . Sufficient time is allowed to elapse for the growth of the radon disintegration products in the chamber, and the activity is then determined by counting x-pulses. Fabrication of the chamber from stainless steel, pure copper or other materials free from heavy metal impurities reduces background. Chambers previously filled with radon atmospheres are outgassed at $50^\circ C$ and 10^{-4} mm pressure. Precautions are taken to avoid spurious pulses in the counting circuits. A detection threshold or 10^{-20} g of radon is claimed. The accuracy of the method has been established by measurements on standard Ra sources.

099-59-800

03000

Huizar, S.P.
Anguera, A.O.

Ciencia 19, 127-9 (59)

Absolute Values Obtained by the
Microgasometer

The values of a chem. reaction by microgasometric measurements are obtainable. These values coincide with the theoretical calcs. By increasing the quantity of the reaction and by decreasing the quantity of the unknown, the values obtained are sufficiently accurate for clinical practice.

980-60-800

03010

Hummer, R.F.

Michelson Labs, China Lake, Cal. (60)

Advancements in Microspectroscopy

This article discussed some recent refinements in color-translation equipment. It describes a new system of translating invisible colors to visible ones so that the application of the technique is more precise and more useful to chemical and biological research scientists.

684-49-151

03020

Hunter, J.A.
Stacy, R.W.
Hitchcock, F.A.

Rev. Sci. Instrum 20, 333-6 (49)

A Mass Spectrometer for Continuous Gas
Analysis

An instrument for recording continuously the relative abundance of gases in a 3-component mixture is described. High accuracy of analysis has been sacrificed in favor of high speed response since the instrument was designed primarily for use in the investigation of respiratory problems. An instantaneous change in gas composition will appear on the record with a lag of 0.2 sec and will require approx 0.1 sec to settle on this new value.

6 84-41-510

03030

Hurst, W.

Rev. Sci. Instrum 12, 265-8 (41)

Recording Sensitive Differential Manometer

A sensitive differential manometer used in the recording of small differential pressures is described. This instrument responds to pressure differences as small as 0.00003 cm. of Hg and as rapid as $80^{\circ}\text{C}/\text{s}$. The moving element is a rectangular glass mirror 0.010 in thick and approx. 0.060 in x 0.080 in supported on a glass shaft 0.007 in dia. Motion is supplied by a thin rubber diaphragm approx. 0.003 in thick. Included in recordings made with the aid of this instrument are wave forms originating in the human neck and finger, also pressure changes in a glass cell enclosing a tracheal breathing insect.

328-62-900

03040

Hutchins, W.C.

Instrum, and Control Systems, 35 No. 4
107-9 (62)

Leak Test Specifications

638-46-151

03050

Hutchinson, D.A.

Research Engr. 8 No. 10 circ 6 3-7 (46)

Georgia Tec. Mass Spectrometer.

724-46-900

03060

Ingels, G.R.

Southern Power and Ind. No. 64 No. 7 62-4 (46)

Photomicrographs Give Answer

Boiler leaks around rivet holes in a boiler were found to be due to cracks originating from the rivet holes and caused by mech. stress incidental to the cold driving of the rivets. Attempts to close the leaks by welding caused addnl. stresses and addnl. cracks. There were no indications of caustic embrittlement or corrosive attack.

997-59-151

03070

Inghram, M.G.
Drowart, J.

Tech Rept. No. 11 Contract DA 11-022-ORD
1993 (59)

Mass Spectrometry Applied to High Temperature
Chemistry

As a result of the success which the mass spectrometer has had in high temperature studies, this summary is presented to show what the technique is, what it can do and what its shortcomings are. To illustrate the importance of the method, a summary of the vaporization results obtained to date is given. A section is also included to suggest a number of additional applications of mass spectrometry to high temperature chemistry.

997-55-610

03080

Ippen, A.T.
Tankin, R.S.
Raichlen, F.

Contract N5 ori-078 (74) (55)

Turbulence Measurements in Free Surface
Flow With an Impact Tube-Pressure
Transducer Combination

This report presents the results of an investigation into the suitability of the use of an impact tube in combination with a capacitance type pressure transducer in measurements of mean turbulence properties. The design features of the instrument which was finally adopted along with a theoretical analysis of its mechanical system are included herein.

980-53-100

03090

Iwasa, M.
Yamai, T.

Japan 6332 (53)

An Apparatus for Detection of Leakage of Gas.

323-48-151

03100

Jacobs, R.B.

Industr. Engng. Chem. 40, 791-4 (48)

Measurement and Control of Leakage in
High Vacuum Systems

The use of the mass spectrometer forms a basis for the newer techniques here described.

801-52-100

03110

Jacobs, R.B.

V.S. Patent 2,608,855 (52)

Method and Apparatus for Measuring
Tightness of Vessels

Accurate measurement of tightness or rate of inleakage of a closed vessel is accomplished by surrounding the vessel under test with helium maintained at a substantially constant concentration, maintaining a substantially constant degree of suction on the interior of the vessel through a conduit, establishing an orifice of known size between the helium and the interior of the suction conduit, taking measurements of the helium concentration in the conduit first with the orifice closed and second with the orifice open, and comparing these measurements to determine the rate of inleakage.

364-47-133

03120

151

170

Jacobs, R.B.

J. Appl. Phys. 18, 34-48 (47)

Zuhr, H.F.

New Developments in Vacuum Engineering

General account of vacuum engineering of K-25 Plant for separation of U235; dynamics of vacuum systems, including use of mass spectrometer leak detector in rapidly responding systems. New Techniques described include "Helium Hood Method" for measuring vacuum tightness.

043-38-130

03130

Jaeger, W.

Brit. 493, 670 (38)

Apparatus for Detecting Gases and Testing
Them for the Presence of Foreign Matter

The gas under test is contained in or passed through an ionization chamber, the change in potential of an electrode within the chamber being measured to indicate the condition of the gas.

997-61-170

03140

Jaffe, J. H.

Contract AF 61 (052) 57 (61)

Design and Construction of Apparatus for
Automatic Determination of Optical Dispersion

An optical dispersion curve is determined by a double instrument. A monochromator selects a wavelength and a refractometer determines the refractive index at this wavelength and a refractometer determines the refractive index at this wavelength. A method is developed that carries out this procedure automatically. Its application to the specific case of the Rehovoth monochromator-refractometer is outlined.

980-57-153

03150

James, A.T.

Fette Seigen Anstrichmettel 59, 73-7 (57)

The Separation and Identification of
Saturated and Unsaturated Fatty Acids from
Formic Acid to Dodecanoic Acid by Gas-
Liquid Chromatography

Sepr. of fatty acids by gas chromatography is reviewed. For C chains of 1-6, the stationary phase was 10% stearic acid in Silicon oil MS 550 at a temp of 100°. The Me esters of the acids, both satd, and unsatd., can be sepd. cleanly at 197° by using either Apiezon M vacuum grease or a high-boiling lubricating-oil fraction as the supporting medium.

090-57-153

03160

Janak, J.
Tesarik, K.

Chem. Listy 51. 2048-54 (57)

Chromatography Semimicroanalysis of Gases

An automatic registering chromatograph is designed. It is based on the direct measurement of the real vol. of gaseous fractions at a const. pressure after the absorption of the carrying gas in alkali.

090-57-153

03165

Janak, J.
Nedorost, M.
Bubenihova, V.

Chem. Listy 51, 980 (57)

Chromatographic Semimicroanalysis of
Gases XIII Separation of Chlorine,
Bromine, and Iodine.

A method has been developed for the determination of halogens, ---by absorbing the gases on silica gel (I), eluting with N or CO₂ and determining polarographically from the increase of Ti (II) wave caused by absorption of halogens in TI (III) solns.

980-59-153

03170

Janak, J.
Novak, J.

Collection Czechoslov Chem. Commun 24,
384-90 (59) 52m 1860d, 536-44, 2652b

Chromatographic Semimicroanalysis of Gases XIV. Direct Determination of Individual Gaseous Paraffins and Olefins in 1,3-Butadiene.

089-56-153

03180

Janak, J.

Chem Tech, 8, 125-32 (56)
Erdol u Kohl 10, 442-4 (57)

New Methods in Gas Analysis

A review with 18 references.

76i-56-153

03190

Jaramasso, M.

Termotecnica, 10, 203 (56)

Vapor-Phase Chromatographic Analysis of
Saturated Gaseous Hydrocarbons

The reproducibility of the method is verified by the chromatographic analysis of liquified petroleum gases and natural gas. The quadratic divergences are ± 0.1 . In the determination of inert gases the possibility of a relative displacement of the peaks in the chromatogram is examined by modification of the thermal conductivity of the carrier gas by means of small additions of other gases.

684-50-800

03200

Jenks, G.H.

Rev. Sci. Instrum. 674-5 (50)

Standard Leak for Testing Helium Leak
Detectors

As indicated above, the article is concerned with a method to test a leak detector. Fine capillaries which have a constant leak rate are generally used, but their calibration may be changed easily and they may be stopped up easily. Here silicon is used which has the most constant diffusion rate given is the temperature remains constant.

684-49-800

03210

Johnson, C.F.

Rev. Sci. Instru. 20, 364 (49)

New Vacuum Gauge

Observations were made on variation of motional impedance of a magnetostrictive transducer, Relevant theory of transducer, and instruments used, are described, with diagram of bridge arrangement at pressures 10mm Hg, maximum bridge unbalance 80mV. A transducer of specified improved design should be usable as fundamental vacuum gauge.

801- -170

03220

Johnson, C.W.

U.S. 2,153,568 Apr

Apparatus for Detecting the Presence of Gases such as Carbon Monoxide in Air

A light-reflective strip is used such as one of cloth impregnated with a soln. such as one of Pd chloride. On reaction with a gas such as CO₂ it reduces the light-reflecting property of the strip. Light reflected from the strip passed to a photoelec. cell which controls an indicator.

980-41-100

03230

Johnson, C.W.

Can 399,088 (41)

Gas-Detection Apparatus

Structural details are described of an app. for detecting CO, illuminating gas, etc.

328-62-540

03240

Johnson, D.P.
Newhall, D.H.

Instru. and Control Sys. 35, No. 4 120-3
(62)

The Piston Gage as a Precise Pressure-
Measuring Instrument

The errors which must be considered for accurate measurements of pressure with various types of piston gages are discussed.

609-53-800

03250

Johnson, E.G.
Nier, A.O.

Physics Rev. 91, 10 (53)

Angular Aberrations in Sector Shaped
Electromagnetic Lenses for Focusing Beams
of Charged Particles

684-56-100

03260

Johnson, E.O.

Rev. Sci. Instrum 27 No. 12 1084-5 (56)

Contamination Gauge

Contamination of Noble gases by very small amounts of O_2 , H_2O or hydrocarbon vapors is detected by the fall in thermionic emission of a tungsten filament.

004-62-155

03270

Johensson, G.

Anal. Chem. 34 No. 8 914-6 (62)

Gas Analysis by Use of Microwaves

The properties of microwave circuits permit highly accurate measurements of dielectric constants. A simple arrangement of two cavities in series can be used for very sensitive relative measurements. Traces of one gas in another gas can be detected if the dielectric constants differ, which is generally the case. The response law is derived and verified experimentally. The influence of selective absorption and dielectric loss is discussed. The device will find application as a detector in gas chromatography especially at high temperatures.

686-51-161

03280

Joachim, J.L.

Riv. combustibili 5, 404-10 (51)

Odorizing of Gas

Tests were performed to det. the intensity of the odor of a gas which contains mercaptan for leak detection purposes. Two methods were used, the first simply evacuating a 2.2-1 bottle, filling with gas, and judging the intensity by smell. The second method utilizes a paper impregnated with Cu oleate which produces colors of green to brown depending on the concn. of mercaptan. Flow of odorant into the distribution lines was carefully controlled by proportioning devices. Detection and alarm instruments were also inserted into the lines for safety.

324-43-151

03290

Johnson, W.W.A.
Norman, D. P.

Ind. Chem. Anal Ed. 15, 119 (43)

Spectrographic Detection and Determination
of the Halogens

Materials contg. dogens, are sparked without prior chem, treatment in the usual high-voltage spark. By this method they can detd. with an accuracy of about 5%. In the case of chloride and bromide the more sensitive lines on the spectrogram were masked by air lines, and consequently observations were made in a CO₂ at. produced by surrounding the electrodes with a simple cylindrical tube through which extremely pure CO₂ was passed. Limits of detection were 0.5% for Cl, 0.3% for Br in CO₂ atm., and 0.1 and 0.7% for F and I resp. in air.

241-41-800

03300

Jones, R. D.

Gas Age 88, 21-3 (41)

Leakage Surveys

Notes on Consumer Gas Co of Reading, Pa. experiences over four years. Methods successively used were bar holes over joints, stethoscope testing, vegetation surveys, and manhold surveys.

364-42-151

03310

Jordan, E.B.
Coggeshall, N.D.

J Appl. Physics 13, 539-50 (42)

Measurement of Relative Abundance with
the Mass Spectrometer

The designs and characteristics of the π -radian and the sectortype magneticfield instruments are described.

980-50-180

03320

Jurecek, M.
Muzik, F.

Collection Czechoslov Chem Commun 15,
236-8 (50)

Beilstein Halogen Test

Compds. which give volatile Cu derivs, will give a green flame. Examples are acetylacetone, dicyandiamide, salicylaldoxime, and 2-mercaptothiazole. If Cu-SCN can be formed, a green color may be observed.

090-50-180

03325

Jurecek, M.
Muzik, F.

Chem. Listy 44, 165-6 (50)

The Beilstein Test

A few addnl. examples of nonhalogenated substances giving a pos. Beilstein test are listed. All substances which yield volatile Cu compds. in the flame may give a pos. test. A specific test for halogens is carried out by placing the substance on a Pt spatula with the flame under Cu gauze.

980-55-221

03330

Kallman, H.

N.Y.U. Physics Dept. Project (196B) (55)

Fluorescence and Conductivity Phenomena

Progress is reported in the study of a-particle induced fluorescence, radiative and non-radiative transitions induced by infrared and beta irradiations, and light emission as a function of time in various phosphors. Experimental results in fluorescence stimulation and quenching, light emission after B-excitation, and dark decay under various temperature conditions are included. Also presented is a review of experimental procedures on evaluation of emission during excitation, a determination of the duration of excitation, and a discussion of results on individual phosphors.

368-49-900

03340

Kalousek, M.

J. Chem Soc. 894-8 (49)

A Torsion Microbalance for Measuring
Low Pressures of Monolayers

A thread is tied in a closed loop and placed on the surface of the H_2O . A reference monolayer is spread inside the loop and the monolayer to be studied is spread outside. The surface pressure of the reference monolayer must be const. and greater than that of the outside monolayer. The loop then becomes circular so as to enclose the max. area. If one point of the loop is fixed and the point opposite is pulled, the loop is forced into the form of two arcs of a circle. The tension is applied to the loop by means of an arm attached to a wt. hung on a torsion wire. When this arm is kept in a fixed position the tension is proportional to the angular displacement of the tension head. Thus the force required to keep the loop at a const. length can be measured by the torsion required to keep the position of the wt. as indicated by a light spot; hence the difference in pressure can be calcd. The sensitivity of the app. is 3×10^{-3} dyne/cm/div .

801-52-220

03350

Kanne, W.R.

U.S. Patent 2,599,922 (52)

Monitoring of Gas for Radioactivity

This ionization chamber, designed to provide a large field strength-to-voltage ratio and having open-mesh screen electrodes so as to permit the largest possible paths in the chamber for B-rays, is particularly useful in monitoring the radioactivity of a gas stream.

801-53-220

03360

Kanne, W.R.

U.S. Patent 2,625,657 (53)

Monitoring Gas for Radioactive Xenon

This ionization chamber for monitoring the radioactivity of a gas stream is arranged so that any ions carried along by the incoming gas will be grounded out prior to the gas entering the ionization chamber.

329-59-800

03370

Kanunov, M.A.
Sokovishin, V.A.

Instrum. and Experimental Tech No. 4
650-3 (59)

Laboratory Vacuum Manipulator

Manipulator for evacuation and production of electric vacuum devices without exhaust tips and getter elements; manipulator provides possibility of simultaneously evacuating and soldering, with low-melting solder, three devices in high vacuum.

333-60-800

03380

Karasek, F.W.
Ayers, B.O

ISA J. 7 No. 3 70-1 (60)

Fast Sampling Valve for Gas Chromatography

A pneumatically-actuated diaphragm valve is described for analysis cycles of 1 min or less, and for single or multiple column configurations.

980-59-153

03390

Karman, A.
Bowman, R.L.

Ann. N.Y. Head of Sci. v72, 714 (59)

Electrical Discharge Tube

An electrical discharge tube for the detection of organic vapors.

980- -153

03400

Karman, A.
Bowman, R. L.

Natl. Heart Inst.

Radiofrequency Glow Detector for Gas Chromatography.

561-60-144

03410

Kautman, J. E.

Oil and Gas J. 58, 100 F22 (60)

Laughing Gas Shows Value in Spotting
Pipeline Leaks

Nitrous oxides as a tracer gas is introduced into water which is used to hydrostatically test buried pipeline. The presence of a leak is indicated by a drop in pressure, and the precise location of the leak is determined by following the pipeline with an infra-red analyser.

684-50-133

03420

Kelly, F.M.

Rev. Sci. Instrum 21, 673-4 (50)

An All-Metal Ionization Gage

An all-metal water-cooled, vacuum gage suitable for rough pressure detns. and leak hunting is described.

378-55-100

03430

Kent, T.B.

J. Sci. Instrum. 32, 132-4 (55)

A Hydrogen Pirani Leak Detector Using a Charcoal Trap

A Pirani leak detector with an activated charcoal trap cooled with liquid nitrogen or solid CO_2 is used for continual vacuum testing of a large number of components. The component to be tested is enclosed in a hydrogen atmosphere which enters the leak and passes the charcoal trap, inducing a pressure rise on the Pirani gauge. The leak size is determined by comparing the deflections obtained from the component leak and a standard leak as given by standard leak

$$\times \frac{\text{component response}}{\text{standard leak response}}$$

This apparatus is capable of detecting a leak of 10^{-3} lu/s within five min. of evacuation, and the smallest detectable leak is of the order of 4×10^{-4} lu/a.

684-47-150

03440

Kenty, C.
Reuter, F.W.

Rev. Sci. Instrum 18, 918-24 (47)

An Apparatus for Micro Gas Analysis

Gas samples of a few ul can be analysed to within a few % accuracy with the described system. Identification of components is made from condensation points, comparison readings of Pirani and McLeod gauges, and differences in speeds of flow. Condensation points at sub-liquid N_2 temperatures are obtained by evaporation liquid N_2 at reduced pressures. Except for the removal of CO and H_2 by ignition with O_2 and O_2 with a W filament, chemical methods have been eliminated. Transfer of minute gas quantities is greatly facilitated by use of small Hg diffusion pumps.

008-49-111

03450

Kersten, J.A.H.
Brinkman, H.

Appl. Sci. Res. A1 No.4 289-305 (49)

Construction and theoretical Analysis of
a Direct-Reading Hot-Wire Vacuum Gauge
With Zero Point Control

A hot-wire vacuum gauge connected to a special bridge, indifferent to voltage fluctuations or changes in the temp. of the surrounding is described. The balance point of the bridge can be controlled independently of the actual gas pressure in the vacuum system. The heating current is adjusted in the region of maximum sensitivity for very low pressures. The instrument has been calibrated from 10^{-5} up to 0.1 mm Hg. Calibration curves for air, H, He, and A are shown. A theoretical analysis of the gauge-bridge assembly is given. The calculated total sensitivity at very low pressures as a function of the heating current appeared to be in fair agreement with the experimental results. Factors determining the pressure sensitivity of a gauge-bridge combination are discussed.

043-57-110

03460

Keulemans, A.I.M.
Kwantes, A.

Brit. 734, 169 (57)

Apparatus for the Analysis of Mixtures of
Gases by Means of Gas-Absorption Percolation

In the app. comprising a gas absorption column (1) and a detection instrument (11) capable of measuring the difference in value of a significant phys. property, e.g., thermal cond., of the carrier gas entering and leaving 1 and contg. a component or group of components of the gaseous mixt. 1 the part of 11 in which the gas is present during measurement, and the conduit connecting 1 and 11 are situated in a single temp.-controlling device.

047-51-133

03470

Kimura, K.
Sakisaka, M.
Miyashiro, S.

Bull Inst. Chem. Res. Kyoto U. 27, 55 (51)

A New Device of a Leak Detector

The glow discharge of a Philips-type vacuum gage shows the characteristic spectra of the gas contained. The spectroscopic difference is caused by a small quantity of air which leaks into the vacuum system. By employing a Se photoelement attached closely to this gage, the difference can be detected by the Photo-electromotive force on a galvanometer. With 1.7 cc of leakage/hr is air, alc. deflects the galvanometer 20-40° after 15 sec., H 10° after 2-5 sec., and acetone 60 or more degrees. The min. quantity detectable is about 0.2 cc/hr is air. Stabilization of the circuit and increase of the photoelement will lower this limit.

980-53-130

03480

Kimura, K.

Japan 1199 (53) 1200 (53)

Apparatus for the Detection of Gaseous
Leakage

An Elec. detector is described in which a const. d.c. circuit is maintained between sealed anodes and cathodes placed at the inlet or outlet and at a midpoint between them. A mech. detector is described in which a const-vol. gas receiver placed between high and low vacuum parts is opened or closed automatically.

378-46-800

03490

King, A. H.

J. Sci. Instrum 23, 85 (46)

Ionization Gauge Control Unit

980-51-112

03500

King, R.W.Jr.

N.Y.U. Res. Div. (51)

Thermistor as a Flowmeter

Thermistors- Uses, Meters, Flow-Electromagnetic

980-58-900

03510

Kinslow, M.

Aro. Inc. AF 40 (600) 700 s/a (58)

Correction for Lag Time in Pressure
Measuring Systems

The basic equations for unsteady compressible laminar flow in circular tubes are applied to the problem of time lag in pressure measuring systems. By neglecting acceleration forces, the time lag equation is obtained for a constant volume system measuring a varying pressure. The conditions for assuming negligible acceleration and laminar flow are developed and their assumption justified.

801- -300

03520

Kinzer, W.W.

U. S. 2,254,609

Leakage-Indicator Compositions Suitable
for Use on Oil or Water Pipes or Other
Equipment

A pigment such as whiting and TiO_2 and a binder such as glue are used with Aniline Blue or other dye quickly sol^d, in escaping liquid so that staining of the compn. immediately indicates leakage when it occurs.

962-56-133

03530

Kirchner, F.
Kirchner, H.

Z angew Phys V8 No. 10 478-81 (56)

The Measurement of Very Low Gas and
Vapour Pressures

The time rate of variation of the electron emission from a freshly heated tungsten point in a discharge tube shut off from the diffusion pump by a heated high-vacuum valve and at pressures of 10^{-7} mm Hg was compared with the readings of an Alpert ionization gauge. The emission varied because of the formation of an adsorption layer covering the tungsten surface. The time for covering the surface with a less than monatomic layer was much greater than one would expect from the number of molecular collisions, in accordance with kinetic theory, corresponding to the gauge pressure, both for air as residual gas and in accordance with former experiments on the adsorption of a monatomic oxygen layer. Since the covering times were considerably shorter when the gauge was connected than when disconnected, it is presumed that the residual gas was not air but a heavily volatile substance which produces conditions similar to that of an oxygen layer. It was shown that the gauge acts as an "ion pump". With a positive field of 6×10^7 V/cm applied to the tungsten point the number of collisions of the residual gas molecules, deduced from the time taken to form a given covering layer, was about double that for zero field and it is calculated that this is in conformity with a value of approximately 4×10^{-24} c.g.s. e.s.u. for the electrical polarizability per residual gas molecule.

980-52-180

03540

Kirsten, W.
Alperowicz, I.Mikrochemie ver Mikrochim Acta 39,
234-44 (52)Micro- and Semimicrodetermination of
Halogens

The results of about 100 expts. are tabulated to show the accuracy attainable by the improvements suggested.

562-52-112

03550

Kittaka, S.
Yamagata, K.
Sukegawa, T.
Sakata, T.

Oyo Butsuri 22, 119-20 (53)

The Use of Thermistors for the Analysis
of Gas.

The change of thermal cond. due to the change in compn. of a mixt. of gases (CO_2 and H_2) is measured by the change of temp. t of a thermistor placed at the center of the vessel. The reproducibility and the deviation from the linearity at high concn. in air are examd.

371-48-100

03560

Klein, W. J.

Het Gas 69, 103-4 (49)
J. Inst. Elec. Engrs. 95, 258 (48)

The Oldham-Poole Explosion Meter, a New
Gas-Leak Detector

Exptl. results are given. Illuminating gas in air is readily detected.

323-42-800

03570

Kline, E.R.

Industr. Engng. Chem 14, 542 (42)

Pressure - Measuring Device for Moderate Vacua.

997-64-112

03575

Klingman, C.L.
Meeke, J.C.

U.S. Bureau of Mines Rept. No. 6353 (64)

An Apparatus for Detecting Helium Leaks

The device developed by the Bureau of Mines is a thermistor bridge detector. It is fairly large when completely self-contained but there is the possibility that it could be reduced in size. It is sensitive to hydrogen, He, methane, argon, and Freon 12. This is not an ultra-high sensitivity device. It is inexpensive and there are some ideas presented worth consideration.

980-54-800

03580

Kloepper, L.W.
Appendix et.al.

Kansas U. Lawrence, Kansas (54)

Van de Graaff Generator Project, Final
Report Feb 1, 48 to Dec. 31, 54, Under
Contract No. ONR 260 T0-2

Reports made on the Van de Graaff Generator Project by a number of
researchers.

966-44-510

03590

Klumb, H.
Schwarz, H.

Z Phys 122 No. 5-8 418-36 (44)

An Absolute Manometer for Measuring the
Smallest Gas-Pressures

An absolute monometer on the radiometer principle for measuring pressures from 10^{-2} to 10^{-3} torr. is described. Electromagnetic damping is employed and the various ranges are obtained by using a counter-torque from the magnetic field of an electromagnet. The instrument is compared with ionization and hot-wire monometer and other instruments, and calibrated by means of a McLeod gauge. The scale is linear at low pressures and can be extrapolated for very low pressures beyond the range of other standard instruments. Test results with air, N_2 , A and H_2 gases are given.

606-54-144

03600

Kluyver, J. C.
Blokhuis, E.W.M.

Physica 20, 427-32 (54)

The Infrared Isotope Analyzer

The investigation of the method for determining isotope ratios by infrared gas analysis has been continued. The amount of carbon dioxide required for a C 13/ C 12 analysis has been reduced . The sensitivity is now 0.005 at % excess C 13 in 8 mg CO₂ . The method has been extended to the determination of the N 15/N 14 ratio in nitrous oxide and the sensitivity reached is 0.015 at % excess N 15 in 6 mg N₂O.

801- -140

03610

Knoedler, E.L.

U.S. 2,241,166

Combustible Gas Indicator

App. suitable for indicating the presence of combustible gas in air comprises a Wheatstone bridge including a filament over which gas to be tested is passed and a combustion chamber unit having a combustion chamber within which the filament is housed and having a pair of distributing chambers communicating with the combustion by way of a pair of slot-like ports substantially coextensive with that dimension of the combustion chamber which is perpendicular to the direction of passage of the gas, by way of one of which distributing chambers and its assocd. slot-like port gas is passed into the combustion chamber and by way of the other distributing chamber and its assocd. slot - like port gas produced from the combustion chamber.

Koch, J.
Bendt-Nielsen, B.

Kgl. Danske Videnskab, Selskab Math-fys

A High-Intensity Mass Spectrograph for Experiments on the Separation of Isotopes

Details are presented for the construction and operation of a mass spectrograph of high intensity. It has a resolving power better than $1/233$ at an ion current of 10 microamp. and an accelerating potential of 50e.kv. It was designed, however, to operate at higher voltages so as to deflect U ions of energy as high as 80e.kv. the max. magnetic field attainable being 8000 oersteds. The ion beam is derived from a low-voltage arc of the Lamar, Samson, and Compton type, and is focused by an electrostatic lens energized from a high-voltage potentiometer. Illustrations of the effectiveness of the app. are furnished by the sepn's of the isotopes of B, Ne, Br, Kr, and Xe. The observed mass-dispersion of the app. are found to be smaller than those calcd. for it, owing to inhomogeneity of the magnetic field.

Kolb, A.C.
Laporte, O.

Mich. U. Engng. Res. Inst. Ann Arbor (57)

Theory of Hydrogen Line Broadening in High-Temperature Partially Ionized Gases

The purpose of this investigation is to study theoretically the broadening of the hydrogen Balmer lines observed in the radiation of high-temperature partially ionized gases. The theory is based on the classical path approximation for the motion of the perturbers. The general problem of the broadening of a group of lines arising from transitions between "nearly degenerate" states is considered. The formalism is subsequently specialized to the case where the broadening due to the interaction between an ensemble of ions and hydrogen atom can be treated as a static perturbation. The validity of this approximation is discussed in detail. The broadening of the Lyman alpha line by electrom collisions is considered in detail for comparison with other theories. For this line, the nonadiabatic and the adiabatic effects are found to contribute in the ratio one to two to the broadening.

684-45-140

03640

Kolin, A.

Rev. Sci Instrum 16, 109-116 (45)

An Alternating-Field Induction Flow Meter of High Sensitivity.

241-40-160

03650

411

Kollock, E.C.

Gas Age 85, 28-32 (40)

Leakage Surveys in Distribution System

Various methods of leak detection discussed as tried by Atlanta Gas Light Co. surveys with listening devices, odorization surveys.

328-62-140

03660

Koolman, R.R.

Instrum and Control Sys 35 No.2 123 (62)

Reference Pressure Cells

The RPC consists of a reference chamber for storage of a precise amount of gas, a thin metal diaphragm welded in place, and a capacitive diaphragm position detectors.

380-39-900

03670

Korshunova, A.
Khlebnikov, N.

J. Techn. Phys. USSR 9, 10 860-9 (39)

Secondary Emission from Thin-Dielectric
Layers

Experiments are described which show that thin layers of KCl give large secondary emission, confirming the result of Bruining and de Boer. From their experiments the authors conclude that the influence of external factors is due to changes they produce in the structure of the layer.

980-58-170

03680

Korolev, W. R.
Bystrov, A.A

Zadodskaya Tech. 24, 109 (58)

Luminescent Method for Detecting Leaks in
Electrovacuum Apparatus and in their Parts.

The mass-spectrometric and H methods are currently in use; however these methods are not as efficient as the luminescent method. The luminescent soln used in the app. exposes leaks rapidly. A dry powder of a luminescent is used in a soln. of trichloroethylene at a concn of 100-200 mg/l. A red-orange luminophor was used. It eliminates false signals. The outside part of the leak after drying emits light when exposed to ultraviolet light.

980-58-153

03690

Kovats, E.
Simon, W.
Neilbronner, E.

Helv. Chim. Acta, 41, 275-88 (58)

Program-Controlled Gas Chromatography for
Preparative Separation of Organic Compounds

For the previously described gas chromatography app. the dependence of the sepn. efficiency on a no. of variables was investigated. Variables studied in the regions indicated were; temp, 60-184 ; retention vol. 1500 and 5000ml; flow rate of the carrier gas 200, 400, and 600 ml/min amt. of sample, 0.12, 0.30, and 0.82ml; and stationary phase, apolar-Celit/Apiezon L and polar-Celite/Emulphor O. The quantity height of equiv. theoretical plate was used to evaluate the sepn. efficiency and was measured in binary mixts. of the n-paraffins; hexane, octane, decanic, and dodecane. Chrodecane, and of c' s and Trans Decalin.

092-48-100

03700

Kralickova, J.

Chemie 3, 89 (48)

Determination of Halogens According to
Stepanow

Pour 3cc. abs EtOH over 10-20 mg of the substance in an Erlenmeyer flask attached to a reflux condenser. Introduce 0.4 g of Na and after 4min add 3cc abs. EtOH and allow it to stand for 3min. After adding 6cc. of Halogen-free water, heat for 3 or 4 min, at the b.p. dil. with water, acidify with HNO_3 and det the Cl by any standard method, but preferably by weighing the pptd AgCl. AmOH contg xylene or toluene can be used instead of the abs. EtOH.

980 - 47- 900

03710

Kreisman, W.S.

Geophysics Corp. of A. Bedford, Mass (60)

A High Vacuum Gauge Calibration System

An ultra-high vacuum type metal and glass system was constructed for the purpose of calibrating vacuum gauges in the pressure region from 760 to 10^{-7} torr. The high vacuum portion of the system is bakeable at temperatures up to 450 C. A Hg monometer serves as a pressure standard in the region from 760 to 20 torr and three specially designed, bakeable McLeod gauges with overlapping pressure ranges serve as pressure standards in the region from 20 torr to $1 \times 1/10,000$ torr. Theoretical accuracies of 1% or better are expected for the McLeod gauge readings in this pressure region. Pressures from $1 \times 1/10,000$ torr to 10^{-7} torr region can be measured, but the accuracy of the readings depends on adsorption and outgassing effects. Results pertaining to the reproducibility of measurements and comparisons of various gauge readings are presented. A pressure rise measurement technique is used to determine how the vacuum gauges and other system components are behaving.

008 - 47 - 900

03720

Kronig, R.
Schwarz, N.

Appl. Sci. Res. A1. No. 1 35-46- (47)

On the Theory of Heat Transfer From a Wire in an Electric Field.

If an electric field is applied between a horizontal heated wire and a concentric cylinder filled with gas, the heat transfer from the wire is increased due to the electrostrictive forces which modify the circulation current of free convection. A new electrical characteristic number is introduced which makes it possible to represent the phenomena in a single graph. From this graph the extra heat loss caused by an electric field of cylindrical symmetry around any horizontal wire in an arbitrary gas can be read off directly.

607-42-140

03730

Kronig, R.

Physica 's Grav 9, 632 (42)

A New Physical Method of Analyzing Gas Mixtures Containing a Dipole Gas as Component

The method suggested is based on the influence of electric fields on the heat convection.

374-52-143

03740

Krumbein, A.D.

J. Opt. Soc. Amer. 42, 277-8 (52)

Grant, F.A.

Ward, A.L.

A Light Absorption Method for the Quantitative Determination of Small Changes in Chlorine Concentration

A method to measure changes in Cl concentration in halogen counter tubes by absorption of ultra violet light.

962-54-110

03750

140

Z. angew Phys. 6 No. 12 541-7 (54)

Krupp, H.

On the Theory of Thermomagnetic Instruments for the Measurement of Oxygen

The types of instruments theoretically discussed are those of Lehrer and Ebbinghaus and of Klauer.

380-47-130

03760

510

J. Tech. Phys, USSR 17 No. 1 64-70 (47)

Krusser, B.V.

Ionization Manometer with d.c. Amplifier

A triode manometer and 2 types of amplifier are described.

980-61-112

03770

Krzhizhanovskogo, I.G.M.

Sci. and Tech Sec. Air Info Div, Wash. D.C.
(61)

Manganese Oxide Thermistors

Experimental investigation of the electrical and thermal properties of thermistors made on manganese oxides confirms the correctness of the Hypothesis which states that the investigated specimens are actually solid electrolytes. Theoretical formulas are derived for the temperature dependence of the coefficient of heat conductivity and thermal emf. Empirical laws are determined to characterize the dependence of the resistance of specimens on temperature, and the dependence of the charge-carrier mobility in the specimens on activation energy. In thermistors made of manganese oxides, O ions, which are the charge carriers, also take an active part in the process of heat transport. In the presence of a temperature gradient is a thermistor semiconducting substance, a nonuniform concentration of O ions appears which leads to the appearance of an emf in the thermistor.

241-59-800

03780

Kroeger, C.V.

Gas Age V124 No. 4 17-19 (59)

Formulating Emergency Leakage Control Plan

Checklist for use in preparing plan which will aid in averting disaster due to gas leakage from mains, services and other facilities; procedures for recording emergency calls, investigation on building premises for high and low concentrations, hazard control at scene of emergency both inside and outside buildings; routine for completion of leakage reports.

003-60-800

03790

Kusnetz, H.L.

Am. Ind. Hyg. Assoc. K. 4, 340-1 (60)

Air-Flow Calibration of Direct-Reading Colorimetric Gas-Detecting Devices

Deterioration of flow-control mechanisms on direct-reading colorimetric gas detecting devices require the calibration of the hand pumps, bellows, or squeeze bulbs used. Field calibration with a buret with a soap bulb as the indicating medium is recommended.

123-51-154

03795

Kuznetsov, V. I.

Doklady Akad. Nauk U.S.S.R. 77, 281-4 (51)

Color Tests for Chlorides, Bromides, and
Iodides

Results obtained in color tests for the halide ions with org. reagents. The colors can be compared with standards and used for estn. of the halides.

980-60-151
620

03800

Lalos, G. T.
Wolk, M.

Naval Ord. Lab. White Oak

Feasibility Study of the Spectroscopic
Determination of Temperature of an
Adiabatically Compressed Gas

An experimental study is reported of the feasibility of measuring spectroscopically the temperature of a rapidly compressed gas. Ar was adiabatically compressed and the resulting radiation photographically recorded. In general, the maximum pressure was 16,000 psi. It was found upon analysis of the time-integrated shot spectrum that the emission resulted mainly from elements from which the compressor is made, i.e. Fe, Cu, Cr, Mn, and Ni. OH bands were also present and were attributed to thermal dissociation of water vapor existing as an impurity. Ar lines were not detected. He was also used as the test gas and gave the same shot spectrum as that obtained with Ar. Time-resolved records taken with a rotating drum camera could not be used for temperature determination because of poor dispersion. Design and construction of a high-speed electrical-mechanical shutter for use in conjunction with a higher dispersion spectrograph made possible recording the radiation during the top part of the pressure-time curve. By this means, effective time resolution was achieved. Emission spectra thus recorded demonstrated the feasibility of spectroscopically measuring the temperature of an adiabatically compressed gas.

684-50-133
510

03810

Lander, J. J.

Rev. Sci. Instrum 21, 672-3 (50)

Ultra-High Vacuum Ionization Manometer

980-57-111
620

03820

Lauramann, J.A.
Ipsen, D.C.

Calif. U. Berkeley (57)

Use of a Free Molecule Probe in High Speed
Rarefied Gas Flow Studies

The feasibility of using a free molecule wire probe for the study of two dimensional gas flows of low density has been investigated for two flow configurations, namely, the leading edge regions of a wedge and a flat plate at zero angle of attack and at nominal Mach numbers of 4 and 6. The results obtained gave a clear picture of the nature of the flow, the shock wave position and boundary layer being easily discernible from the change in temperature and heat transfer coefficient of the wire.

684-40-133

03830

Lawton, E.J.

Rev. Sci. Instrum. 11, 134 (40)

Vacuum Leak Testing

Painting a leak with CCl_4 caused sharply increased electron emission and directing a stream of O or H at the tube caused decreased emission of a W filament ion gage. The emission change is a more sensitive and satisfactory method of leak detection than measurement of the ion current. The effect of Hydrocarbon vapors from stopcock grease is discussed.

378-53-133

03840

Leck, J. H.

J. Sci. Instrum V 30 No. 8 271-4 (53)

Sorption and Desorption of Gas in Cold-Cathode Ionization Gauge

Study in which rate of clean up, between 10^{-6} and 10^{-4} mm of Hg was measured for variety of gases and vapors, such as nitrogen, argon and water vapor; effect on accuracy of gage; how errors introduced depend both on design of gage and on gas present in vacuum system.

684-57-133

03850

510

Leck, J. H.

Rev. Sci. Instrum. V28 No. 2 119-21 (57)

Martin, C. S.

Feedback Controlled Heat Conductivity Gauge for Measuring Pressure in Vacuum Systems

Describes a simple feedback circuit for the hot wire Pirani gauge. This gauge is used for measurement at low pressures where the heat conducted away from a thin hot wire is a function of the gas pressure. The wire is included in a Wheatstone bridge circuit which serves both to heat the wire and to measure its temperature. In the circuit described the heat input is adjusted automatically so as to keep the wire temperature approximately constant over a wide range of pressure changes. This is achieved by supplying the power from a magnetic amplifier which is controlled by the wire temperature, a fall in temperature increasing and a rise in temperature decreasing the power supply. In this way pressure measurements can be made over the range zero to 3mm Hg with wire temperatures of the order of 50 to 100°C by using either the feedback signal or the power output from the amplifier to give a measure of the pressure.

980-57-147

03860

Leck, J.H.

London, Institute of Physics (57)

Pressure Measurement in Vacuum Systems

Gives a comprehensive treatment of the subject in following chapters; (1) Mechanical manometers, (2) Thermal conductivity gauges, (3) Ionization gauges, (4) The Knudsen radiometer gauge, (5) Surface reaction techniques, (6) Gauge calibration. Numerous practical examples of design are included and a list of nearly two hundred references is given.

378-53-133

03870

147

510

J. Sci. Instrum V35 No. 3 107-8 (53)

Leck, J. H.

A Feedback Controlled Pirani Gauge

A simple feedback circuit for the Pirani gauge is described, in which the power supply to the Wheatstone bridge is adjusted automatically so as to keep the wire temperature approximately constant over a wide range of pressure changes. This is achieved by supplying the power from a d.c. amplifier, which is itself controlled by changes in wire temperatures, a small fall in temperatures serving to increase the power output from the amplifier. A transistor is employed as the input stage of the amplifier. The comparatively large zero drifts in the transistor d.c. amplifier due to temperature changes are no particular disadvantage in this application as the Pirani gauge signal is also dependent upon ambient temperature.

378-54-133
510

03880

Leck, J. H.

J. Sci. Instrum. 31, 226-7 (54)

A Quartz-Coated Wire Pirani Gauge

As pirani filaments of tungsten and platinum have a certain disadvantage at temperatures above 600 K, the use of a quartz-coated filament is suggested. This type of filament is accurate to within 2% for pressures from zero to 5mm Hg at 900-1000 K. At high pressures and over prolonged operating periods errors may rise to $\pm 5\%$. The zero drift is negligible. The fragility of quartz-coated wire, the necessity for removing the coating by hydrofluoric acid at the ends to obtain an electrical contact and the inapplicability of helical construction to increase its effective length, are the practical disadvantages of quartz-coated wire.

443-53-700

03900

Lecomte, J.
Taieb, J.
Thebault, J.

Le Vide 8, 1422-6 (53)

The Electronic Circuits of a Leak Detector

The electronic circuits of a double monochromator tube spectrometer are described.

845-53-700

03910

Lecomte, J.
Taieb, J.
Thebault, J.

Vide 8, 1422-7 (53)

Some Remarks on the Electronic Circuits for a Leak Detector

The leak detector is of the mass-spectrometer type.

375-56-133
221

03920

Lefort, M.

J. Phys. Radium V17 No. 2 164-5 (56)

Utilization of the Ionization Produced by
Alpha Rays for the Microanalysis of Gases

The method depends on the fact that for a given pressure the ionization current in an alphasatron gauge depends on the nature of the gas.

084-54-113
133

03930

Leger, E. G.

Canad. J. Technol 32, No. 6 199-205 (54)

An Instrument for Leak Detection and Pressure
Measurement in High Vacuum Systems

An instrument is described for measuring gas pressure in the range 10^{-1} to 10^{-7} mm of Hg. At the higher pressures vacuum thermocouples are used and at the lower pressures ionization gauges. Leaks are detected by spraying oxygen on the outside of the vacuum system and noting the decrease in electrons from a tungsten filament emitter in an ionization gauge when it is operated as a saturated diode. Leaks are traced either by observing a meter or by means of the change in frequency of an audio-oscillator. To avoid damage an automatic cut-off is used to turn off the gauges and diffusion pumps when the pressure reaches a predetermined value.

962-50-100

03940

Lehrer, E.
Ebbinghaus, E.

Z. angew Phys 2 No. 1 20-4 (50)

An Apparatus for Determining Oxygen Mag-
netically in Gas Mixtures

Constructional and operational features are given of a recording apparatus for estimating oxygen in technical gas mixtures.

721 - 44 - 800

03950

Lemon, H. M.
Wise H.

Science 99, 43-4 (44)

A Flowmeter for use in Air-Sampling Procedures.

725- 49 - 900

03960

Lennartz, A.
Middledorf, R.

Studdeut Apoth Ztg. 89, 593-5 (49)

Semimicro Determination of Organic
Thiocyanates

A method based on splitting organic sulphur compounds with standard $\text{Na}_2(\text{Pb}(\text{OH})_4)$ (1) iodine solution is described. The method is accurate to 0.5%. In general, an alkaline solution of the compound is treated with 1 solution contg. 0.5% Pb, the mixture allowed to stand 30 minutes the Pb mercaptide and PbS filtered off by suction and washed with slightly alkaline water, and the excess Pb deluted in the filtrate by precipitation PbSO_4 dissolving the ppt. in NH_4OAc and titrating with standardized $(\text{NH}_4)_2 \text{MoO}_6$ solution with tannin as indicator.

329-59-151

03970

Leont'ev, N. I.
Udovichenko, Y. K.

Instrum. and Experimental Tec. No. 1
105-8 (59)

Omegatron

Mass analyser for measurements in region of light masses; principle of operation of instruments, which is highly sensitive due to absence of collimating slots, is based on cyclotron resonance of ions; accuracy for determining isotope content of normal neon is plus or minus 5%.

004-52-153

03980

LeRosen, A. L.
Movarek, R. T.
Carlton, J. K.

Anal. Chem. 24, 1335-6 (52)

Streak Reagents for Chromatography

Tests given using reagents, with color results given for 13 different solutions.

802-55-100

03990

Levina, L. E.

Uspekhi fiz Nauk V55 No. 1 101-10 (55)

Modern Methods of Leak Detection

The paper has 30 references covering the last seven years all to Western work.

684-60-151

04000

Levine, L.
Lichman, D.

Rev. Sci. Instrum V31 No. 7 731-3 (60)

Analysis of Gas Evolution from Titanium
Hydride Gas Generator

Gas analysis on metal bakable high vacuum system, carried out with aid of omegatron mass spectrometer to determine purity of hydrogen evolved from titanium hydride source, used for hydrogen gas generation and control inside vacuum system in program involving study of beam-generated plasmas.

980-45-140

04010

Lewis, G.N.
Calvin, M.

J. Amer. Chem Soc. 67, 1232-3 (45)

Paramagnetism of the Phosphorescent State

It has been shown that the phosphorescent state is a triplet state and therefore paramagnetic. An attempt has been made to measure the paramagnetism using a modification of Theorell's apparatus. When the gas surrounding the phosphor contained O_2 , a small movement in the expected direction was observed at the moment illumination began but was followed almost immediately by a much larger movement in the reverse direction. A movement only in the expected direction occurred when the surrounding gas was A of CO_2 . Phosphors were of fluorescein dissolved in boric acid glass and of such concentration and thickness as to absorb nearly all the incident light. Two long thin rectangular samples were used: one, a solid slab of boric acid solution, the other of similar material coarsely ground and attached to a ribbon of cellophane with rubber cement. The magnetic force at 20,000 gauss/cm width was 4.1×10^{-3} mg wt for the first sample and 4.7×10^{-3} mg wt for the second. Neither of the two results is accurate to better than 10%.

980-55-144

04020

Liberti, A.

Chimica e Industria V38 674 (55)

Applicability of the Infrared Spectrophotometer as Analyzer in Gas Chromatography

The application and procedure described analyzed a propane-propene mixture with an error of about 1%.

801-54-800

04030

Lichtenberger, H. V.

U.S. 2,691,773 (54)

Valve Leak Detector

A valve for fluids at above atmospheric pressure is described which replaces the conventional packing glands with a positive type seal. This is accomplished by designing the valve to be seated by rotating a nut rigidly attached to the valve handwheel which moves a shaft into its seat to close the valve. The seal is provided by two flexible bellows, one within the other, with their ends attached to the moving shaft and its stationary housing, respectively. Indicating means are provided to detect failure of either of the bellows.

364-60-151

04040

Lichtman, D.

J. Appl. Physics V31 No. 7 1213-31 (60)

Use of Omegatron in Determination of Parameters Affecting Limiting Pressures in vacuum Devices

Use of mass spectrometer to determine residual gases in vacuum systems including ion pump systems; analysis performed to determine residual gases in vacuum tubes which are difficult to outgas; and conditions that lead to considerable hydrogen content are described; examples of use of omegatron mass spectrometer as tool in aiding solution of outgassing problems.

324-60-610
800

04050

Linford, A.

Ind. Chemist 36, 107-13 (60)

Recent Developments in Fluid Flow Metering

Fluid flow metering advices are discussed, including the Dall differential pressure tube and orifice, the electromagnetic flow meter, and the ultrasonic flow meter.

378-50-147

04060

Lloyd, J.T.

J. Sci. Instrum 27, 76-7 (50)

An Audible Vacuum-Leak Indicator

An apparatus is described which is suitable for indicating pressure changes over the range from 10mm to less than 0.1mm of Hg. It employs a two-electrode discharge tube whose electrical characteristics depend on the nature and pressure of the gas it contains. If such a tube is inserted in a vacuum line and used as a variable factor in a simple relaxation oscillator circuit, the oscillation frequency, made audible by a loud-speaker, will serve as an indicator of the discharge conditions. The device is stated to be particularly useful for testing Geiger-Mueller counter using a two-stage rotary pump.

684-38-800

04070

Lockenvitz, A.E.

Rev. Sci. Instrum 9, 417-20 (38)

Radiometer-Type Vacuum Gauge

A radiometer-type vacuum gauge is described, which is rugged and simple to construct, which can be calibrated from the dimensions of the gauge and for which the temperature of the moving system does not enter. The gauge, when constructed entirely of metal, has a range from 2 dynes/cm² to 0.01 dyne/cm². If constructed of glass, the lower limit can be extended to 0.001 dyne/cm² or better.

801-55-130

04075

Loevinger, R.
Chubb, T.A.
Monk, G. W.

U.S. Patent 2,727,995 (55)

Leak Detector

He molecules entering the detector are ionized by means of a cold cathode ionization chamber. The ions are then accelerated into a region of lower pressure where they are caused to follow arcuate paths thus providing an ion beam. A charged electrode is displaced from the ionization chamber along the arc of travel of the ions at substantially the focal point of the beam in order to suppress the ions of low energy content. A collector is disposed beyond the focal point on the arc of travel of the ions for collecting the high energy ions. The important feature of this invention is provision of the suppressor electrode which operates to permit only the He ions to reach the collector.

522-49-800

04080

Loevinger, R.

Natl. Nuclear Energy Ser. 1-58 (49)

Fundamental Considerations in Vacuum Practices

A discussion of mol. velocities, gaseous diffusion, thermal diffusion, thermal cond. of gases, viscosity, flow through thin, small and thin, large apertures, flow through pipes, thermal transpiration and diffusion through porous barriers, and pumping speeds of vacuum pumps and of cold traps. Other references are given for vacuum gauges, vacuum materials and equipment, and leak detecting instruments and techniques.

998-48-800

04090

Loevinger, R.
Guthrie, A.

Leak Detection Instru. and Techniques VI
Chap V (48)

Vacuum System Leaks

The locating and repairing of leaks in vacuum systems is probably the most troublesome aspect of high vacuum technique. In this chapter is given first a rough method of estimating the flow of various gases through small capillary holes, then a description of all the successful methods of leak detection normally available and finally an indication of the method of formulating quantitatively the performance of leak detection techniques. Information is submitted concerning the flow characteristics of small capillaries, methods of leak detection, pump-outs, the vacuum analyzer, the helium leak detector, general leak hunting procedures, repairing of leaks, outgassing, virtual leaks, and theory of leak detection.

375-55-112

04100

Lortie, Y.

J. Phys. Radium 16 No. 4 317-20 (55)

Utilization of Thermistors as Vacuum Gauges

A study of the use of thermistors in Pirani-type gauges in the pressure range 1 to 10^{-3} mm of Hg. Uses a Wheatstone bridge and keeps the glass envelope containing the thermistor at constant temperature.

524-58-220

04110

Lowe, A.E.
Moore, D.

Nature 182, 133-4 (58)

Scintillation Counter for Measuring Radio-activity of Vapours.

An instrument is described which counts the carbon-14 content of vapors emerging from a gas chromatographic apparatus parallel with the analytical chromatographic record. The chromatographic vapors are condensed into a circulating liquid phosphor, a solution of diphenyl oxazole in xylene. The scintillations excited in the phosphor by the carbon-14 are detected with a photomultiplier. A schematic sketch of the instrument is included.

378--51-510

04120

Luck, C.P.

J. of Sci. Instrum. V28 173-6 (51)

Membrane Manometer with Secondary Air
Transmission

This is an instrument designed to take precise blood pressure reading and record them.

105-56-144

04130

Luft, K.F.

C.R.Acad Sci. V242 No. 4 482-4 (56)

Gas Analysis by Non-Dispersive Infrared
Absorption

A refinement of the original Luft method suitable for estimating a gas (a) whose absorption band overlaps with those of impurities. The detector consists of two different length gas tubes in series containing (a) and connected respectively to the opposite sides of a condenser vane.

105-50-140

04140

Luft, K.F.

C.R.Acad Sci. (Paris) 230, 1460-2 (50)

New Method for Determining Paramagnetic
Gas

A direct method of high sensitivity and ease of measurement is described. The method is likely to permit of following relatively rapid changes in O concentration during metabolic processes.

962-51-142

04150

Luft, K.F.

Z. angew Phys 3, 300-3 No.8 (51)

A New Method of Magnetic Analysis of
Oxygen

An inhomogeneous magnetic field is used to determine the oxygen content of gaseous mixtures of various oxygen concentrations . The principle and theory of the method and some results obtained are given.

103-50-142

04160

Luft, K.M.

Compt Rend 230, 1460-2 (50)

A New Method for the Determination of
Paramagnetic Gases

A method for detg. paramagnetic gases is described. In this a modulated magnetic field, produced by rotating one pole of a permanent magnet, is applied to the gas and the variation in pressure induced are analyzed by means of a flexible membrane and a condenser, a method of pressure measurement described previously. The method is improved in sensitivity by using a pair of sample tubes one contg. a sample of known concn. The advantages claimed for the method are: (1) exact measurement of the susceptibility (2) sensitivity (3) ease of measuring difference of O content of two gases and (4) quickness of response. Rapid variations in O content can be readily followed; this can be applied to studies of basal metabolism. The limit of detection of O is said to be 0.04% with special care, 0.01% .

980-60-140

04170

Lukasik, S.J.

Stevens Inst. of Tech. Hoboken, N.J.
Progress Rept. (60)

Research Program on Conversion of Explosive
Energy

Magnetic field compression experiments were continued, using an interim 1000 joule bank. The circuit parameters of this systems were investigated to calculate the magnetic field in the load prior to its explosive compression. The signals induced in pick-up loop during the firing were then analyzed in terms of a simple model picturing a constant total flux trapped in an area that is decreasing due to the expansion of the copper-clad explosive. The most successful compression was from an initial field of 4700 gauss to a final field of 38,500 gauss, or by a factor of 8.2. Efforts to obtain higher magnetic fields by redesigning the load coil and explosive piston and by working toward a higher initial magnetic field are continuing. Conductivity studies are being directed toward removing possible secondary effects in the conductivity measurements. These include the confinement of the detonation and consequent changes in the reaction zone due to the structure supporting the double probes and the T-probes, the effect of the T-probes plate, thickness, the difference between internal and surface conductivity measurements and air-shock induced conductivity.

161-54-130

04180

Lundberg, D.A.

Electronic Eng. V26 No. 320 436-40 (54)

Differential Leak Detector for Evacuated
Vessels

Apparatus for locating very small leaks in evacuated cathode ray tubes; was of Klemperer type cold cathode ionization gages in bridge circuits whose balance is disturbed when jet of calor gas passes over leak.

096-59-151
170

04190

Luscher, E.

Chimia 13, 284-5 (59)

Light Detectors for Vacuum Spectroscopy

980-56-160

04200

MacLeod, S.

Griffiss Air Force Base, Rome, N.Y. (56)

State-of-the-Art in Olfaction

This paper is a general survey of present day state-of-the-art within the area of olfaction. Following the introduction, an orientation is included to supply background information regarding the nature of olfaction and pertinent olfactory phenomena. Existing analytical methods and theories of olfaction are then discussed and appraised. The final section is devoted to a review of current civilian and military olfactory applications leading up to a final prospectus for future research and development.

801-52-140

04210

MacNeille, S.M.

U.S. Patent 2,600,891 (52)

Vacuum System Leak Detector

This patent covers an easily operated leak detector of the type which employs a gas probe in which the passage of the foreign gas through the leak causes a voltage change in a gage and associated oscillator means whereby an audible sound is produced.

801- -121

04220

McCollam, H.J.

U.S. Patent 2,400,940

Gas Detection Apparatus

This apparatus detects the presence of hydrogen in gases. It has a vessel evacuated of nearly all hydrogen within which is a tubular envelope. The envelope is permeable to hydrogen at high temperatures. The envelope is heated and any H₂ passing into the vessel will permeate the envelope and cause a change in conductivity which is proportional to the amount of hydrogen present.

980-59-140

04230

McCurley, E.P.
Blake, C.

Mass. Inst. of Tech. Lexington (59)

A Simple Null-Indicating Saturable Core
Magnetometer for the Detection of Static
Magnetic Fields.

The construction of a simple null-indicating magnetometer employing a saturable core is described. The device is useful for detecting static magnetic fields of the order of 0.1 millioersted. It was built to enable the establishment of a near zero magnetic field over a limited volume by means of pairs of Helmholtz coils. A test signal incorporated into the instrument affords a check on the sensitivity.

801-58-150

04240

McEvoy, J.E.

U.S. Patent 2,821,462 (58)

Continuous Gas Analyzer

The app. is capable of simultaneous analysis for free O and combustibles . It generates O and H for simultaneous catalytic combustion at heated filaments. The app. is useful for analysis of flue gas and of exhaust gas from internal-combustion engines.

980-59-180

04250

McGregor, W.K.
Ehrlich, J.J.
Bratcher, J.D.

Rept. on Aro, Inc. (59)

The Visible Plasma Flame Spectra of Argon and Helium

The electromagnetic spectrum is being employed as a diagnostic tool in research on the kinetics of gases expanding through nozzles. The spectra of argon and helium plasma generated in an electric arc plasma generator are reported. Tables are given of emission lines detected in the range of 3000 to 7000 Å using a grating spectrograph; quantum transition data from referenced sources are included for each emitted line. The spectra are notable for their apparent freedom from emissions caused by the gas stream contamination and for the distinct appearance of lines attributable to ions. The data obtained indicates the utility of the spectral data for gas stream diagnostics.

684-50-151

04260

McKinney, C.R.

Rev. Sci. Instrum V21 724-30 (50)

Mass Spectrometer

A Nier-type mass spectrometer and its associated electronic units have been constructed for the purpose of measuring small variations in the abundances of oxygen of mass 18 and of carbon of mass 13 in CO_2 , and of oxygen of mass 18 in oxygen gas, to an accuracy of 0.01% of the abundance of these isotopes.

980-57-111

04270

Madan, M.P.

J. Franklin Inst. V263 No. 3 207-12 (57)

Simple Bridge Method for the Measurement of Thermal Conductivity of Gases and Gas Mixtures

A simple bridge (hot -Wire) method for the measurement of thermal conductivity of gases or gaseous mixtures is discussed and its design developed. A rigorous mathematical theory is applied to calculate the various corrections and to obtain the value of the thermal conductivity in terms of the conveniently measured quantities.

684-58-155

04280

Magee, J.B.
Crain, M.

Rev. Sci. Instrum. V29 No. 1 51-4 (58)

Recording Microwave Hygrometer

Describes a rapid response microwave hygrometer for continuously recording the water vapour pressure of atmospheric air over a wide ambient range. The principle employed involves the measurement by means of a cavity resonator of the contribution of water vapour to the refractive index of atmospheric air. The device described also has potential application to the continuous measurement of the degree of contamination of one gas by another gas or gases.

378-48-133
510

04290

Makinson, R.E.B.
Treacy, P.B.

J. Sci. Instru. Phys. Ind. 25, 298-9 (48)

An Ionization Manometer of High Sensitivity

An ionization manometer is described in which the trajectories of the thermionic electrons are lengthened by means of a magnetic field. The ion-collecting electrode is a cylinder, the anode a wire along its axis and the filament is near the collector parallel to the axis; an axial magnetic field is applied. A sensitivity of 380uA per micron was obtained at pressures below.

980-61-144

04300

Malkmus, W.
Thomson, A.

General Dynamics/Convair, San Diego (61)

Infrared Emissivity of Diatomic Gases for the
Anharmonic Vibrating Rotator Model

In order to compute the emissivity of a diatomic gas, a simplified model of a diatomic molecule is assumed: an anharmonic oscillator with the first approximation to the vibration-rotation interaction. For a given band, the frequency of emitted radiation is expressed as a quadratic function of the quantum number m , which is solved to express m as a function of ω . This expression is substituted for m in the equations used for computing the average line intensity and average line spacing. By applying the random Elsasser model to the fundamental and superposed higher order bands, closed-form solutions are obtained for the emissivity as a function of ω for certain limiting cases. Experimental data, where available, are used for the line widths and total absorption of the bands. The harmonic oscillator approximation is used to estimate strengths of higher order bands for which experimental data are not available.

980-58-210

04310

Malvicini, A.
Polvani, C.

Comitato Nazionale per le Ricerche
Nucleari, Milan

Review of the Principal Methods for the
Detection and Measurement of Radioactive
Contaminants in Gaseous Media

The methods of detection and measurement of radioactive contaminants in air and gases are described. The direct methods examined are measurements using the scintillation chamber for alpha particles, ion current detection instruments, pulse ionization chamber, and the proportional counter. The indirect methods examined are the analysis of activities obtained by filtration of air, by electrostatic precipitation, by filtration of air through absorbing materials, differential separation and collection of air dust by impact, and by collection of dust from the flow.

681-57-153

04320

Manch, R.

Record Chem Progr. 18, 69 (57)

Vapor-Phase Chromatography

980-50-190

04330

Mannelli, I.G.
Rossi, M.L.

Ann. Chim(Rome) 40 163-5 (50)

Adsorption Indicators

The literature of adsorption indicators (Fajans) in argentometry is reviewed and the use of Martius Yellow is proposed. Experiences with adsorption indicators furnishing a variety of color changes in the argentometric detn. of halide ions are reported.

044-62-151

04340

Marsden, D.G.H.

Rev. Sci. Instrum 33 No. 3 288-93 (62)

Panoramic Mass Spectrometer

A panoramic rapid scanning sector mass spectrometer is described, a mass ratio of ten to one may be scanned in times ranging from 10m sec to 300 u sec; the peaks are displayed on the screen of an oscilloscope. Alternatively, single peak height variations may be displayed down to times of 10u sec. The instrument is designed for following gas reactions at pressures up to 200mm and temperatures up to 450 C. Some comparison is made with fast-scanning time-of-height instruments.

044-60-624

04350

Mansfield, W.K.

Brit. J. Appl. Phys. V11 No. 10 454-61 (60)

Pre-Breakdown Conduction in Continuously -
Pumped Vacuum Systems

Measurements have been made under impulse conditions of coefficients A^+ , number of H ions emitted/250 kev H ion and B^+ number of H ions emitted/250 kev H ion, for metal surfaces covered with contaminating layers; product of these coefficients suggests that pulse discharge conduction is due to regenerative exchange of positive and negative ions of hydrogen; transient nature of conduction is thought to be due to charging up of insulating contaminant.

764-40-800

04360

Marsh, A.E.L.

Faraday Soc. Trans 36, 626 (40)

Flow Meter for Slow Flow

A new type of flow meter is described which is independent of the viscosity of the gas for which it is used.

980-55-210

04370

Martin, A.B.

North American Aviation, Inc. Downey, Cal.
(55)

Inman, G.M.

Sodium Graphite Reactor

Further reactivity calculations have been performed for the steady-state Pu feed-back technique and results are presented. Tests for determining and maintaining the optimum purification of the inert blanket gas are described. The fuel handling coffin development studies are summarized. With other functions and results of experimentation on the reactor are presented.

524-56-156

04380

Martin, A.E.

Nature V178 407-8 (56)

The Sonic Gas Analyzer

Refers to the successful development of a commercial form of sonic gas analyzer by Dawes, Walton, Lawley and Mountfield. The principle of operation involves the use of two equal tubes each fitted with a deaf-aid earpiece at each end. At end A of each tube the "earpiece" is used as a sound source while at the opposite end B of each tube the earpiece is used as a microphone. By electronic techniques it is easily possible to measure the phase difference of the sound arriving at the two receivers $B_1 + B_2$. This is zero when the gases filling the tubes are the same but becomes finite and measurable if one gas is heavier than the other.

168-56-153

04390

Martin, A.J.P.

Experientia, Suppl No. 5 21-32 (56)

Gas Liquid Chromatography

004-54-154

04395

Masten, M.L.
Stone, K.G.

Anal Chem. 26, 1076-7 (54)

Argentometric Determination of Halides by
Use of the Dead-Stop End Point

Mixt. of halides can be detd. by titration in succession with
standardized AgNO_2 with Ag electrodes and a dead-stop technique. The polarograph
or equiv. elec. circuit can be used.

091-60-130
153

04400

Matousek, S.

Chem prumysl 10, 16-21 (60)
Ionization Detector for Gas Chromatography

The detector is made from a brass cylinder of 90mm diam with an 8mm diam
hole forming the ion chamber. Insulators for the support bar of the measuring electrode
are made from quartz and Teflon. The measuring electrode is formed from steel wire of
1mm. diam. and 50mm length. A closed Sr^{90} ionization source with 50mm active
length, 3mm width, and with an effective activity of 8mc is used. Sensitivity is
defined as $S = AC_1C_2C_3/W$ where A is the peak area in sq.cm. C_2 is the recorder
reading in mv/mg. while for catarometers the max. is 300-800. The time const is 0.2
sec. The linear dependence of the ionization current on the concn of the measured
component was confirmed on the $\text{H-C}_2\text{H}_2$ mixt.

980-39-800

04410

Maurer, W.

Phys. Zeits 40, 161-81 (39)

Light Excitation by Ion and Atom Collisions

The author gives a resume of existing knowledge of excitation by the collision of ions and atoms with the subsequent emission of light. The following topics are dealt with: sources of ions, form of the excitation function, excitation of both partners in the collision, excitation by protons, alkali ions and the atoms H and D, transfer of momentum and the conservation of the spin in collisions, absolute light yield.

980-50-142

04420

Medlock, R.S.

Trans Instrum Meas. Conf. Stockholm
102-6 (49-50)

Oxygen Analysis Based on its Paramagnetic Properties

The "magnetic wind" is described, by means of which the O_2 may be measured by its paramagnetic property. An improved instrument has been devised and its performance mathematically determined. One recorder had an accuracy of 0.05% O_2 in a range of 0-5% O_2 with a 10 in scale.

980-61-144

04430

Meltzer, I.

Servo Corp. of A. Hicksville, N.Y. (61)

Industrial Preparedness Measure for Thermistor Bolometer Infrared Detectors

Pilot production assembly of non-immersed bolometers was practically completed. Evacuation and final testing of these units was started and final assembly of the immersed units was continued.

004-57-180
200

04435

Menis, O.
House, H. P.
Rains, T. C.

Anal. Chem. 29, 76 (57)

Indirect Flame Photometric Method for
Determination of Halides

The method described for the detector of halides is of value for the analysis of extremely dilute halide sol. for which ordinary titration methods are unsatisfactory. It is based on the decrease in luminosity of a standard silver solution due to addition of halides.

327-51-510

04440

Meriam, C.

Instruments V24 231-2 (51)
Monometers

A discussion on the industrial applications of manometers.

327-51-510

04450

Meriam, J. B.

Instrum, and Control Syst. 35 No.2
114-8 (62)
Manometers

Very elementary discussion of monometers

121-50-800

04460

Meyeren, W.A.V.

Dechema Monograph 14 No. 143/56 48-56
(50)
New Developments in High-Vacuum Techniques

The theory of diffusion pumps is discussed along with a history of their development.

726-58-153

04470

Miettinen, J. K.

Suomen Kemistilehti 31A 149-74 (58)
Gas Chromatography

980-56-133
510

04480

Millar, W.

Atomic Energy Res. Est (Harwell) (56)

Theory and Design of an Acoustic
Pressure Gauge

In the pressure range 10^{-2} to 10^3 mm Hg. a number of well established types of gauge are in use. These include manometers, McLeod Gauges, Pirani gauges and comparison devices using a mechanical diaphragm. Each of these types has its own limitations in convenience, accuracy or working range. A type of gauge is proposed here in which these limitations could be less serious, and which will cover the whole of the above range. Operation of the instrument depends on the amplitude of received signal at the end of an "acoustic transmission line" which is simply a tube containing gas at the pressure to be measured. A simple form of the gauge has already been constructed, which works well for air; design proposals are given for a gauge of general applicability.

087-62-620
622

04490

Miller, D.R.

Chem. Eng. Progress 58 No. 4 77-84 (62)

Injection Mixing of Gaseous Reactants

An experimental approach to the difficult problem of jet penetration and mixing. A correlation is given which describes conditions studied.

Miller, F.A.
Hemingway, A.
Mier, A.O.
Knight, R.T.
Brown, E.B.
Varco, R.L.

J. Thoracic Surg. 20, 714-28 (50)

The Development of and Certain Clinical Applications for a Portable Mass Spectrometer

Hypercapnia is discussed. A recording, portable, mass spectrometer (1) is described, which will report the concn. of 5 gases in a mixt. every 20 sec with 1% accuracy. In 34 operations the tracheal concn. of CO_2 was detd. The CO_2 values detd. with 1 for tracheal air were lower than calcd. The pH and CO_2 concn. of blood were also detn. The av. max. CO_2 in different operations was 7%. On one occasion CO_2 rose to 17.3%. Results obtained with 1 are useful in uncompensated respiratory acidosis or alkalosis due to shifts in CO_2 concn. When breathing 30% alkalosis due to shifts in CO_2 and 70% O_2 ; 3 of 10 dogs died suddenly upon receiving doses of pentothal or numbutal readily tolerated by normal dogs. Respiratory acidosis was the probable cause of the increased tolerance since the blood pH was as low as 6.61 in some cases.

980-41-620
800

04510

Miller, A.R.
Roberts, J.K.

Proc. Camb. Phil Soc. 37, 82-94 (41)

Theory of Adsorption of Gases on Solids When the Potential Energy Varies Continuously Over the Surface

In developing the theory of adsorption, taking into account the interaction between adsorbed particles, it has been usual to employ a physical model in which it is assumed that there is a fixed interaction energy between particles adsorbed on neighboring sites on the surface. In this paper the differences between the behavior of this model and that of actual surfaces are discussed by considering a 1-dimensional film in which the potential energy of a single adsorbed particle varies continuously and periodically with its position on the surface and in which there is a repulsive force between adsorbed particles, which varies with the distance between them according to an inverse power law. For such a physical model the variation of the heat of adsorption with the fraction of the sites occupied is considered in detail and it is shown in particular that there is much less difference between the behaviour of mobile and immobile films than is indicated by the earlier model in which a fixed interaction energy is assumed. These results are considered in connection with the interpretation of experiments on the adsorption of H on W.

684-62-800

04520

Miller, G.A.

Rev. Sci. Instrum 33 No. 1 8-11 (62)

Construction and Calibration of a
Cylindrical Knudsen Gauge

The construction and calibration of a Knudsen gauge of the Klumb-Schwarz modification is described. A practical method of correcting for nonlinearity is developed.

004-49-144

04530

Miller, R.D.
Russell, M.B.

Analyt. Chem V21 773-7 (49)

A Continuous Analysis of Gas Streams

A continuous analysis of gas streams is provided by the absorption of bands in the infra-red by heteroatomic gas molecules. The analyzer was made out of brass tubing and the appropriate cells.

605-46-800

04540

Millest, D.M.

Phil Mag. 37, 323-34 (46)

The Sensitivity of a Space-Charge Detector
to the Presence of Positive Ions of Helium
with small Kinetic Energies

The energies are in the 25-125eV range, and the ions augment the space-charge-limited electron current from a hot cathode to a neighbouring anode. The increase is measured as a function of; (1) the potential difference between anode and cathode, (2) the cathode temperature, (3) the kinetic energy of the ions, and (4) the He pressure. The minimum positive - ion current which can be measured with the detector is investigated.

684-51-151

04550

Milner, C.J.

J. Sci. Instrum. Suppl I 29-36 (51)

A Cold-Cathode Mass Spectrometer
Leak Detector

A cold-cathode spectrometer has the advantages of robustness, long life and avoidance of refrigerated traps. In the instrument described, the use of an a.c. amplifier for the ion current, in conjunction with velocity modulation of the ion beam, greatly reduces background effects. Leaks smaller than 10^{-5} ul/sec can be detected in vessels whose gas output is up to 1 ul/sec. Gas outputs up to 100 ul/sec can be handled by the instrument's pumps, with proportional increases in detection limit. Various features of the design and characteristics are discussed. Some observations are made with regard to the applications and field of use of the instrument.

244-47-154

04560

Minchin, L.T.

Gas J. 251, 100 (47)

The Detection of Carbon Monoxide or
Town Gas in Air

A review of methods for determination of CO, with particular reference to the "Mark III Carbon Monoxide Indicator Tube", which was developed during the war for the rapid estimation of CO in the air of a Pilot's cockpit. It depends on the size of the brown stains produced in silica gel impregnated with yellow K pallado-sulfate.

980-58-110

04570

Minter, C.C.

Naval Res. Lab. Washington, D.C. (58)

A New Thermal Conductivity Leak Detector
and Its Applications

This report describes a simple thermal conductivity apparatus of special design having several advantages over the mass spectrometer so widely used for this purpose. Procedures are described for using the new apparatus to locate leaks in vacuum or pressure systems using hydrogen or helium as probe gas. Experiments to determine the sensitivity of the apparatus toward small changes in concentration of freon in air are described, and it has been concluded that leaks in refrigeration equipment can be located even when appreciable concentrations of freon are present in the ambient air.

684-58-110

04580

Minter, C.C.

R. Sci. Instrum. 29, 793 (58)

Thermal Conductivity Leak Detector

The metal bridge block is connected between vessel being tested and pump in such a way that the gases from vessel must pass through both sides of bridge block, that is through all four cells. The bridge will be unbalanced due to drop in pressure in the gas stream which will cause the filament in the cells nearest the pump to have a slightly higher resistance than those nearest leak. The bridge is then balanced, after which any probe gas coming to bridge block will cause the bridge to be unbalanced and the indicator on the ammeter will show a deflection. It is supposed to be easier to use than the mass spectrometer.

684-60-110

04590

Minter, C.C.

R. Sci. Instrum. 31, 458 (60)

Vacuum Leak Testing With Liquids

A thermal conductivity bridge is used to detect the presence of liquids such as water, heavy water, alcohols and acetone from small leaks in a vacuum system.

004-51-110

04600

Minter, C.C.

Analyt. Chem. 23, 143-7 (51)

Burdy, L.M.J.

Thermal Conductivity Bridge for Gas Analysis

The apparatus described will analyze a ternary mixture of, e.g., H_2 and CO_2 with air without the need to remove one component by absorption. Two conventional bridges are combined, the cells of one being of larger diameter which introduce a "convection" effect. The method can be used on any ternary mixture whose constituents differ sufficiently in thermal conductivity.

323-47-110

04610

Minter, C.C.

Industr. Engng. Chem. 19, 464-5 (47)

Use of Convection Effects in Gas Analysis By Thermal Conductivity

A method has been developed for analyzing a ternary mixture of gases by comparing its thermal conductivity with that of a binary mixture of known composition, and then comparing the effect of pressure on convection for the two mixtures. While the ternary mixtures investigated consisted only of H , CO_2 , and CH_4 , the method should be applicable to other combinations of gases that do not react chemically with each other.

997-61-110
132

4615

Minter, C.C.
Anderson, S.F.
Dalk, R.W.

Naval Res. Lab. Washington, D.C. (61)

The NRL Model E-5753 Leak Detector

A 21 lb. portable Freon Leak detector has been developed. Air from the vicinity of a probe is pumped through tubing so as to first pass two of the four cells of a thermal conductivity bridge and then through a length of tubing around to the other pair of cells. Thus if the probe is moved past a leak, the bit of Freon containing air unbalances the bridge first in one direction and then in the other. These unbalances cause the successive flashing of a red light and a white light in the Lucite probe head, where the operator's attention is focused. Since the air flows past one end of each conductivity cell and not through it, a lag time occurs before the sample diffuses into the cell and reaches the filament; this lag time is predominant in producing a total lag time of at least 3 to 4 sec. Bridge excitation is by a regulated ac power supply, and the output signal when the bridge is out of balance goes to a five-stage RC-coupled transistorized amplifier. Printed circuit and plug-in construction facilitates circuit checking and amplifier replacement. While the indicator gives a clear response for a Freon concentration of 4 to 5 ppm, such sensitivity is not needed under service conditions, where detection of the signal produced by changing the concentration of Freon by 50 ppm is satisfactory in most cases.

801-57-180

4616

Mitchell, H.A.

U.S. 2,809,101 (57)

Open Flame leak detector.

980-51-143

4620

Moeller, T.
Moss, F.A.J.

J. Am. Chem. Soc. 73, 3149-55 (51)

Observations on the Rare Earths

The ultraviolet absorption spectrum of the Gd^{3+} ion was reinvestigated of both an Cl^- and ClO_4^- soln., under conditions of high resolution. The spectrum is characterized by 18 absorption peaks and 2 definite inflections in the wave-length region 2400-3150 Å.

Moll, W.H.J.
Burger, H.G.

A Techn. Phys. 21, 9, 199 p. (40)

Thermo-electric Vacuum Meter

It is possible to change the pressure range through which a thermocouple vacuum meter works by the use of differently sized elements. For example, short heavy elements will shift the working range to higher pressures, while long, thin elements are useful at 1. p. A pressure meter is described which, by using thermocouples of various sizes, has a useful range from 10^{-1} mm of Hg to 10 mm Hg pressure. The 2 pressure-sensitive units, each formed of a long, thin thermocouple element in series with a short, thick one, form 2 arms of a Wheatstone bridge and are so connected that the thermal e.m.f.'s are in opposite directions. The other 2 arms of the Wheatstone Bridge consist of resistance boxes. The bridge current also serves as the source of heat for the thermocouples. The bridge is balanced with a high vacuum in the bulb containing the pressure sensitive elements. As the pressure increases, the thermal e.m.f.'s change with the thermocouple temperatures and unbalance the bridge. Since the balance of the bridge is unaffected by the direction of the heating current, a.c. may be used. The range of a thermocouple meter may be extended up to a pressure of 1 atm. by attaching the heater wire to the thermocouple at some distance from the junction itself. If the junction is placed above the heater wire, air convection will cause a temperature rise of the junction which depends upon the heat convection current and therefore upon the gas pressure.

845-57-800

04640

Monodjin, G.

Vide 12 No. 71 395-7 (57)

Calibration of Helium Leak Detectors

Two methods are used: (1) a controlled leak method; (2) the helium air mixt. method. (1) is preferable at low, (2) at high pressures.

980-53-800

04650

Monicard, R.

Revue de l' Institut Francais du Petrole et
Annales des Combustibles Liquides V8 No. 12
555-60 (53)

Etude d' un detecteur d' hydrocarbures avec
avertisseur de danger

Hydrocarbon detector, developed by French Petroleum Institute to control atmosphere in certain localities and test stations, is equipped with alarm device for signalling leakage of highly inflammable jet engine fuel JP4: it is modification of previously developed IFP Wheatstone bridge detector No. 3-1 and can be applied, with certain slight modifications in refineries, gas plants, pumping stations, mines and on tankers.

980-51-800

04660

Monicard, R.

Revue de l' Institut Francaise du Petrole et
Annales des Combustibles Liquides V6
No. 9 324-30 (51)

Etude d' un Detecteur de Frites d' hydro-
carbure

Study of Wheatstone bridge hydrocarbon detector No. 3-1 of French Petroleum Inst. detector modified in order to detect leaks of hydrocarbons and combustible gases; tests performed in field have shown possibilities of apparatus and way it has to be used.

980-51-800

04670

Monicard, R.

Revue de l' Institut Francaise du Petrole et
Annales des Combustibles Liquides V6 No. 11
379-83 (51)

Etude theorique du Detecteur d' Hydrocarbures
a pont de Wheatstone

Theoretical study of hydrocarbon detector by means of Wheatstone bridge No. 3 of French Petroleum Institute; determination of maximum sensibility of apparatus; determination of theoretical sensibility curves of apparatus as function of temperature of platinum filaments which were established experimentally.

370-46-210

04680

Montgomery, C.G.
Montgomery, D.D.

J. Franklin Inst. 241, 55-58 (46)

An Integrating Radiation Meter

An instrument for permanent installation in a department, indicating the quantity of gamma and X-radiation received by personnel in its vicinity. A Geiger counter chamber is connected to an amplifier, the output current of which is integrated by an electrolytic cell, the quantity of gas liberated is proportional to the number of discharges of the chamber, and the instrument is calibrated in terms of the tolerance dose received by workers in a day.

164-53-140

04690

Montgomery, W.J.

Elec. World, 140, 112 (53)

Indicator Detects Gas-Filled Cable Leaks

An electrical cable, lead jacketed and filled with nitrogran is divided into approximately equal sections. At each joint a device consisting of two glass tubes, partially filled with oil is placed. A rise in the oil level indicates a leak.

980-57-800

04700

Mora, G.A.

Anales real soc espan fis y quim 53 B
697-700 (57)

Potentiometric Determination of Halides
With Glass Electrode, Using Sensitization
with Sodium Thiosulfate.

Data of typical titrations are given.

380-39-800

04710

Morgulis, N.

J. Techn. Phys. U.S.S.R. 9, 10, 853-9 (39)

Nature of Secondary Emission from Compound
Kathodes

The author gives a theoretical discussion of the high secondary emission
from compound kathodes.

009-56-224

04720

Morrison, G.H.

App. Spectroscop 10 No. 2 71 (56)

Neutron Activation Analysis Trace Elements

The principle of neutron activation analysis and the auxiliary technique of
gamma scintillation spectrometry for use in detg. trace elements to $10^{-8}\%$ are presented.

323-47-800

04730

Morse, R.S.

Ind. Eng. Chem. 39, 1064-71 (47)

High-Vacuum Technology

A review of the present status of industrial techniques and processes in the pressure range of 10^{-5} to 10^{-1} mm Hg. Equipment construction, including valves, shaft seals, gages, diffusion pumps, and steam ejectors, is discussed. Methods of leak detection are reviewed and compared. The following processes are described; evacuation of electronic devices, such as radio tubes, photocells, rectifiers, fluorescent lights, or cyclotrons; evapn. of metals and salts for production of low-reflection optical surfaces, mirrors, decorative plastic parts, and elec. condensers; vacuum ore reduction; distn. of high-mol-wt. substances such as vitamins, fats, and oils; vacuum dehydration of thermally sensitive materials such as plasma, penicillin, and orange juice.

980-61-800

04740

Mortenson, L. N.
Pearson, R.K.

Wyle, Labs. El Segundo Calif. (61)

Evaluation Testing of Flow Sampling Wedge

The purpose of this test program was to evaluate the suitability of a Wedge-Type Flow Sampling System for use in an Air Force Base Propellant Loading Systems and other liquid and gas flow systems where contaminant levels are to be determined under full flow conditions. The flow sampling system was designed and manufactured by Wyle Labs. El Segundo, Calif. A detailed description of the Wedge-Type Flow Sampling System, and the test program which was performed to evaluate the performance of the sampling system, is included.

980-56-151

04750

Mayer, W.H.
Plotter, E. C.

Babcock and Wilcox Co. Alliance, Ohio (56)

Leakage Measurement Technique

The leakage measurement techniques which are used by the Babcock and Wilcox Co. in testing pressure vessels, gaskets and other equipment are described. The use of the mass-spectrometer type He leak detector is preferred where high sensitivity is desired. An appendix shows calculations comparing relative amounts of water and helium leakage to be expected. Results of leak tests of vessels in production are included.

609-42-620

04760

Mrozowski, S.

Phy, Rev. 61, 379-80 (42)

Quenching and Depolarization of Resonance Radiation by Collision with Molecules of a Foreign Gas.

002-51-800

04770

Mueller, F.P.

Am. Gas J. 174 No 2 21-3, 26 (51)

Gas Leak Detection Practices

Practices of 6 different gas companies are outlined. It is practically impossible to locate and identify flammable gases by means of any one single instrument.

442-58-153

04780

Muenster, H. K.

Lab. Sci. 6, 12-23 (58)

Chromatographic Analysis of Gases
and Vapors

402-52-610

04790

Muller, F.H.

Kolloid-Z 129, 146-7 (52)

Origin of Turbulence

Maxwell's relaxation term expresses the fact that a certain fraction of the statistically occurring mol. jumps is directed, that is nonrandom. It holds only for small deformation rates, just as the dielec const. is independent of the field only for small degrees of orientation. In the general case another parameter besides the relaxation time is required, such as the fraction of directed jumps. As and where the velocity gradient increases, the dynamic viscosity increases and the more nearly solid-like regions give rise to the appearance of curls. It can also be shown that below the crit. velocity the laminar, and above it the turbulent flow has the higher entropy. It will be shown elsewhere that the theory retains its validity for gases. Also the hydrodynamic similarity relations are covered. The only statement about the curls is that they appear in pairs.

980-50-153
222

04800

Muller, R. H.
Wise, E. N.

Los Alamos Scientific Lab (50)

The Use of Beta-Ray Densitometry in Paper
Chromatography

The absorption or scattering of a finely collimated beam of B rays may be used to locate and evaluate the various zones on a paper chromatogram, quite independently of the chemical nature of each component and depending primarily on its density. A densitometer for this purpose consisting of a narrowly collimated Sr 90 source of B rays, a chromatogram sample holder, a methane-type ionization chamber, and a pulse-integrating counter which drives a Brown recorder has been built. Scale ranges vary in steps from 500 to 500,000 cpm for full-scale deflection on the recorder. A simple application of part of this equipment to the rapid analysis of labeled chromatograms is described.

046-53-110

04810

Mund, W.
Van Meerssche, M.
Guidee, C.

Bull Acad. Roy, Belgique C1 Sci. 39
No. 8, 9 676-83 (53)

A Variant of a Thermoconductimetric Method
of Analysis of Gaseous Systems

Describes an apparatus involving simultaneous use of 3 cells, and ensuring a better accuracy in the analysis of gaseous mixtures by measuring their thermal conductivity. Each Pyrex-glass cell is 12cm long and 6mm inner dia. with a centrally placed Pt heating wire 0.04 mm thick. The method is described in detail and the results of the analysis of H₂ - He mixture are tabulated.

095-59-113
153

04820

Musgrave, W.K.R.

Chem and Ind. 46 (59)

Thermistor Detectors for Gas Chromatography

Type 1 of type A thermistors, resp., are sealed with cold-curing silicone rubber, one into a cavity of, and another into a gas flow through channel of a brass block. If type A thermistors are used the bead of the thermistor in the gas glow-through channel is exposed by removing the bottom half of the glass envelope. Pairs of thermistors of 1000, 2000, and 500,000 ohms resistance resp. have comparatively little tendency to disintegrate when used for the detection and sep'n. of quinones, phenols, and phenolic ethers at 180-220°. Ball joints, sealed into the ends of the gas flow through channel with a cold-curing silicone rubber, facilitates the attachment of the brass block to the outlet of gas chromatographic columns.

980-60-610

04830

Napolitano, L. G.

Naples, U. Italy (60)

Turbulent Mixing of Streams of Different Gases

Exact solutions for constant temperature isovel turbulent, two dimensional mixing of two infinite streams of different gases are presented. Three solutions were obtained, based on three different phenomenological models for the turbulent transports. The three different phenomenological models assumed are illustrated and discussed first. Pertinent equations are then derived and exact closed form solutions are obtained for each one of the three considered. An analysis of the characteristics of the mixing region is carried out and the differences in the distributions of the mean properties for the different models is brought forth. The experimental tests to be performed to determine the physically more appropriate model are finally discussed.

980-60-613

04840

Narasimha, R.

Guggenheim Aeronautical Labs, Pasadena (60)

Nearly Free Molecular Flow Through an Orifice

An estimate is made of the deviation of mass flow m through an orifice from its limiting free molecular value m^0 . Using a method proposed by Willis it is shown that this deviation is of the first order in E , the inverse Knudsen number, defined as the ratio of the radius of the hole to the mean free path in the gas at upstream infinity. An estimate of the coefficient is obtained making some reasonable assumptions about the three-dimensional nature of the flow, and the value so derived, giving $m = m^0 (1 \pm 0.20 E)$, shows fair agreement with the measurements of Liepmann.

722-52-142

04850

Naumann, A.

Siemens-Z 26 134-40 (52)

An Oxygen Meter Based on Magnetic Considerations

A detailed description, with 14 diagrams and illustrations, is given of a meter for the quantitative determination of oxygen in a mixture of gases, which is based upon the selective property that of all the technically important gases only oxygen is paramagnetic, the other gases being diamagnetic.

247-49-130

04860

Neff, J. R.

Gen. Elec. Rev. V52 41-4 (49)

Halogen Type Leak Detector

Considerations are observed for obtaining the maximum service from the halogen type detector in factory testing of products by individual and group testing methods. It emphasizes detection of spot leak detectors.

This device is a hand held probe which is passed over the surface of a vessel being tested for leaks, using halogen vapor. Any leak large enough to permit loss of 1/10 of an oz. of freon gas a year is instantly detected as the element passes over the leak area.

684-57-800

04870

Neher, H. V.
Prakash, S.

Rev. Sci. Instrum, 28, 267 (57)

Metal System for Chemical Reactions and for Studying Properties of Gases and Liquids.

684-45-121

04880

Nelson, H.

Rev. Sci. Instrum 16, 273-5 (45)

The Hydrogen Gauge—an Ultra-Sensitive Device for Location of Air Leaks in Vacuum-Device Envelopes

A sealed-off, highly evacuated ionization gauge has a section of its envelope made of thin Pd sheet which, when heated, is highly permeable to hydrogen. The gauge is attached to the manifold of a vacuum system with the Pd section isolating it from the vacuum. When the manifold or any vacuum device connected to it is probed with hydrogen, leaks in the system are indicated by an increase in the ion current of the gauge. This new technique because it utilizes a sealed-off, highly evacuated gauge which responds only to hydrogen and is unaffected by other residual gases and vapours, provides a simple but sensitive test for very small leaks.

684-45-133

04890

Nelson, R.B.

Rev. Sci. Instrum 16, 55-7 (45)

An a.c. Operated Leak Detector and
Ionization Gage

A small leak in a vacuum system may be found by observing the change in temp-limited thermionic emission of a W filament in the system as O_2 is blown over the leak. An electronic app. is described for regulating the filament heating power so that the emission is not affected by line voltage fluctuations. A leak of 10^{-3} cc. of air per hr. has been readily detected. The app. also operates as an ionization gage with emission control.

380-39-151

04900

Nemenov, L. M.
Fedyurko, A.S.

J. Tech, Phys 9 1879-82 (39)

Design and Construction of a Mass-
Spectrograph

A mass-spectrograph of the Aston type with a metal tube is described. It allows detection of mass differences of 0.05%.

980-60-800

04910

Ness, N.

Space Sci. Labs. Phila. (60)

Foreign Gas Injection Into a Compressible
Turbulent Boundary Layer on a Flat Plate

The distributed injection of a foreign gas into a compressible, turbulent boundary layer in the absence of a pressure gradient is considered. The analysis is performed within the framework of the binary mixture concept, that is, the primary fluid flowing over the surface represents one component while the injected species represents the second. Calculations have been performed for the injection of helium into undissociated air. The results indicate the effect of Mach number on surface shear and energy transfer when distributed light gas is injected normal to the surface. A comparison with experimental data indicates reasonable agreement over a range of Mach Number.

684-62-147

04920

Neville, J. R.

Rev. Sci. Instrum 33 No. 1 51-5 (62)

Electrochemical Device for Measuring
Oxygen

An electrochemical device for measuring oxygen in gases is described which utilizes a gold indicator electrode and a cadmium reference. Filled with electrolyte and encapsulated with a thin polyethylene menbrane, this cell gives a current proportionate to the oxygen partial pressure. The unit requires no power or polarizing voltages and can operate unattended for relatively long periods of time. Functional characteristics of the device are discussed in order to suggest potential applications.

044-52-800

04930

Nief, G.

Brit. J. Appl. Phys. 3, 29 (52)

Differential Methods of Vacuum Leak
Detection.

A device for leak detection consists of an ionization gauge protected by a leak air trap. The presence of the leak-testing gas, whose vapour pressure must be negligible at liquid air temperature, is detected by the drop in pressure. Compensations for manometer fluctuations due to variable pumping speeds, gas evolution from walls, unsteady rate of flow of leaks and fluctuations in gauge cathode emission are discussed. At residual pressure of 5×10^{-5} mm Hg a pressure variation of 2×10^{-8} can be observed.

401-60-222
223

04935

Nielsen, Th.

Kernteknik, 2, 201-2 (60) Institutt for
Atomenergi, Kjeller, Norway

An Apparatus for the Continuous Monitoring
of Beta and Gamma Activity of the Air and
Off-Gases at Various Sites

The construction of a device which permits the continuous monitoring of the beta and gamma activity of the air and off-gases at 10 different measurement stations is described.

363-40-100
800

04940

Niemeyer, H.W.

J. Am. Water Works Assoc. 32, 1354-8 (40)

Leak Detection

The principle methods of leak surveying include pitometer measurement and sound pick-up methods; these and the radio leak locator are described.

364-47-151

04950

Nier, A.O.
Stevens, C.M.
Hustrulid, A.
Abbott, T.A.

J. Appl. Phys. 18, 30-3 (47)

Mass Spectrometer for Leak Detection

A simple low-resolution instrument is described. One part of He in 200,000 parts of air can be detected in high vacuum equipment.

522-49-151

04960

Nier, A.O.
Stevens, C.M.
Hustrulid, A.
Abbott, T.A.
Stein, F.S.
Binns, J.E.

Natl. Nuclear Energy Ser. Div. 11, 16
Eng. Develop. in the Gaseous Diffusion
Process, 31-44 (49)

Mass Spectrometer for Leak Detection

If a stream of an inert gas is directed against a leak of a vacuum system this gas can be readily detected by a sensitive mass spectrometer. With He as a test gas, and with a specially designed mass spectrometer the sensibility could be brought to detect 1 part of He in 150,000 parts of air.

004-59-110

04970

112

153

Nogare, S.D.

Harden, J.C.

Anal. Chem 31, 1829-32 (59)

Programmed Temperature Gas Chromatography
Apparatus

Details are given for the construction and performance of an app. used for rapid sepns. of polar or nonpolar mixts. contg. compds. in the boiling range of 35-300°. The app. included an elec. heated column and a linear temp. programmer designed for heating rates of 2.5-30°/min, a thermistor-equipped thermal cond. cell and bridge, and a const. differential type of flow-controller for the carrier gas (He). The detector had a sensitivity of 1900 ml x mv/mg at 240° cell temp. The effect of varying column temp. on the detector sensitivity was prevented by installing a brass buffer block between the column and detector.

980- -222

04980

Norris, T.H.

Oregon State College.

A Gas-Sample Counting Method for Soft
Beta Emitter

A simple, rapid, and accurate gas-counting method for soft-beta emitters such as S³⁶ and C¹⁴ is described. The method involves the use of a sample holder independent of the G-M counter. The holder has its own end window adapted to fit in close proximity to a very thin end-window counter. The holder window itself can be very thin inasmuch as a pressure-equalizing system is used in introducing the gas sample.

367-39-154

171

04990

Noyes, W.A.
Henriques, F.C.

J. Chem. Phys. 1 767-74 (39)

Fluorescence and Photochemical Kinetics
of Polyatomic Molecules in the Gas Phase

Various mechanisms for the excitation and quenching of fluorescence are discussed. It is pointed out that the classical Stern-Volmer mechanism may apparently be obeyed in cases where the process is not that of simple absorption followed by fluorescence and collisional deactivation. For polyatomic molecules a spectroscopic examination will not always disclose definitely the nature of the emitting radical or molecule. A study of the effects of several variables on the intensity of the fluorescence will frequently give much information about the lifetimes of the emitting molecules and the course of the photochemical reactions taking place. Quantitative studies of the fluorescence in the gas phase have been made for very few polyatomic molecules.

886-49-800

05000

Nuttall, E.D.

World Oil 129 No.6 197-8 (49)

The Bird Air Detector

The presence of a predetd. amt. of air in a gas pipe line is detn. by means of a gravity balance. The detector can be arranged so as to operate a solenoid valve which controls the flow of gas in the line. It is especially adapted for a gas-gathering system which can be operated under a partial vacuum.

484-50-154

190

05010

Nuttem, A.J.

Metallurgia 42, 407-10 (50)

Some New Indicators in Various Titrimetric
Processes

Tests of various indicators are given with their color results.

980-57-620
800

05020

Nyumura, T.

Bunseki Kagaku 6 241-2 (57)

Apparatus for Gas Analysis Based on Vapor
Pressure Temperature Curve

The methods of Campbell and Sebastian and Howard were improved by
simplifying the app.

374-44-157

05030

O'Bryan, H.M.

J. Opt. Soc. Amer. 34-774 (44)

Rayleigh Interferometers for Gas Analysis

Describes modifications of the Rayleigh interferometer for measuring refractive indices of gases. One is the use of a four compartment cell, giving twice the sensitivity without increase in overall length. Another is the use of auto-collimation, in combination with a four-compartment cell, in a portable instrument for measuring concentration of toxic gases in industrial atmospheres.

841-53-133

05040

Ochert, N.
Steckelmacher, W.

Vacuum 2, 125-36 (53)

Leak Detection Practice With Particular
Reference to the Hydrogen Palladium Method

The principles of leak detection are discussed with specific reference to the Pirani and palladium-barrier ionization gauges as used to detect hydrogen applied externally as a test gas. Plant based on these techniques, with the detector in the backing space and other refinements, are described. The testing of single or multiple vessels based on this type of plant is discussed in detail with special reference to applications outside the vacuum field. The problem of leak testing completely sealed components is also discussed. The paper concludes with a consideration of calibrated reference leaks, for a quantitative assessment of the leakage rate, when testing to a specification.

167-48-900

05050

Oetjen, G.W.

Elektrotechnik, Berlin 2 333-40 (48)

Aspects of High-Vacuum Technique

A survey of modern development with regard to the two principle aims: (1) to reduce the pressure in a given column within a definite time to a desired value while the course of the process is supervised by continuously readable and as far as possible inertia-free instruments, and (2) to remove gases and vapours flowing through the apparatus including those produced by porosity and gassing of the walls at a given pressure. Tables and graphs give data on rotary ejection and diffusion pumps and on complete pumping units, the properties of working fluids, and on the co-ordination of pumping speeds of fore and fine pumps. "Vacuum constancy" is defined as the highest permissible total pressure on the discharge side of a diffusion pump at which the fine pressure does not rise above 10^{-4} mm Hg. Gauges are critically surveyed and the use of the alphasatron and of the mass spectrometer for leak finding are discussed.

614-49-612

05060

Oldroyd, J.G.

Proc. Intern. Rheol. Congr. 11 130-4 (48)
111 44-6 (49)

A Suggested Method of Detecting Wall Effects
in Turbulent Flow Through Tubes

An attempt is made to extend the arguments hitherto applied to turbulent flow of Newtonian liquids to high-polymer solns. A method of plotting exptl. results is suggested by which a wall effect might be detected.

980-60-900

05070

Olfe, D.

Guggenheim Jet Propulsion Center, Calif. (60)

Equilibrium Emissivity Calculations for a
Hydrogen Plasma at Temperatures Up to
10,000° K.

The important equilibrium emission processes in a hydrogen plasma have been investigated in the temperature range between 300° K and 10,000° K for pressures up to several hundred atmospheres. Representative emissivity calculations have been carried out for a transparent gas at a total pressure of 100 atmos and a mean beam length of 30 cm. Important emissivity contributions were made by the pressure-induced fundamental vibration-rotation band and rotational lines of H₂ at the lower temperatures, i.e. below approximately 4500°K. Above this temperature, the bound-free and free-free transitions of the H- ion and the continuum and line radiation of the H atom are the most important contributors to the emissivity. The following emission processes were also investigated: the bound-free transitions of the H₂ ion, free-free transitions of colliding H atoms and H- ions, electronic transitions of the H₂ molecule, quadrupole vibration-rotation transitions of the H₂ molecule, and vibration-rotation transitions of the HD molecule. In addition, the effects of the lowering of the ionization potentials by the fields of plasma ions and of the very broad wings of the Lyman α line have been considered.

482-59-150

170

900

Ovenall, D.W.

Peaker, F.W.

05110

Makromol, Chem 33 222-36 (59) 237-43

Light-Scattering Instrument for Molecular
Weight Measurements

Further design developments of a light-scattering instrument are described showing stable and sensitive photomultiplier tubes with a plane front window. The use of MgCO_3 surface as a standard diffusion reflector is discussed and performance of the instrument is explained. Differential refractometer for use in light-scattering studies on polymer solutions. Modifications of the Rayleigh interferometer was accomplished by inserting an extra set of stationary inclined plates in the fiduciary system. The modified instrument is said to measure larger refractive index differences and can be used in light-scattering studies. The plan and elevation of the refractometer are shown diagrammatically, and an interferometer cell is illustrated.

001-49-130

150

05120

Paabo, K.

Rottenberg, M.

Acta Chem Scand 3, 1444 -5 (49)

Mercurimetric Modification of Zacherl
and Krainick's Micromethod for Halogen
Determination

For the micro detn. of halogens a modification of the Zacherl and Krainick method is used in which the indirect alkalimetric method is replaced by the direct, mercurimetric titration. The halide soln. is titrated with 0.01 N $\text{Hg}(\text{NO}_2)_3$ soln. which has been standardized against NaCl . Diphenylcarbazide is used as the indicator. This method gives satisfactory results with halogenated hydrocarbons and fatty acids as well as with nitrogenous substances. With a sample contg. S, however, the results are unsatisfactory.

684-48-800

05130

Packard, E.M.

Rev. Sci. Instru. 19, 435 (48)

A Proton-Controlled Magnetic Field Regulator

980-61-800

05140

Pakulak, J.M.

Naval Ordnance Test Sta, China Lake Cal.
(61)

Thermal-Rate Studies on a Double-Base Propellant Using a Derivative Differential Thermal-Analysis Technique

In derivative differential thermal analysis, the application of a single probe, using an RC network, makes it possible to use a less complicated apparatus to study the thermal changes in a propellant. Because no reference standard is necessary, any size sample may be analyzed without regard to differences in heat capacities, probe centering or location in the block—common considerations for samples and reference material in differential thermal analysis. The resulting kinetic studies that were performed on a double-base propellant as a standard for further propellant studies show that the first exotherm peak varies with the heating rate. A negative straight-line relationship was utilized for heating rates from 0.2 to 5.55°C/min. The order of reaction, shape index, activation energy and frequency factor were considered.

980-56-800

05150

Patterson, G.N.

Institute of Aerophysics, U. of Toronto (56)

Theory of Free-Molecule Orifice-Type Pressure Probes in Isentropic and Non-Isentropic Flows

This report presents the theory of a pressure probe in the form of an orifice in the side of a tube which may be orientated in any direction relevant to that of the mass motion and which is so small, compared with the local mean free path, that such a tube will measure the local speed ratio in isentropic and nonisentropic flows and suggests that in strong shock waves it may be possible to determine the viscosity and heat conduction, that is, the deviation from Maxwellian molecular motion.

524-60-800

05160

Paty, L.

Nature, 185, No. 4714 674-5 (60)

Pumping Effect of Gas Discharge High-Vacuum Pump

Some properties of high vacuum pump with high pumping speed based on principle of transport of ions during discharge in magnetic field.

721-46-142
800

05170

Pauling, L.

Science 103, 338 (46)

Wood, R. E.

Sturdivant, J. H.

An Instrument for Determining the Partial Pressure of Oxygen in a Gas

The operation depends on the fact that oxygen has a much higher magnetic susceptibility than any other gas. The force on a test body surrounded by the gas in an inhomogeneous field is measured by means of a torsion balance. The precision depends on the range of pressures for which it is to be used.

043-59-131

05175

Paumier, J. A.

Brit. 817, 146 (59)

Terrasson, P. E.

Apparatus for Detection of Halogen Compound Vapor Leaks

An app. is described for rapid detections of small leaks of halogens gas or refrigerants contg. halogens. It consists of a catalytic Pt decompn. chamber, an NH_3 reaction chamber, and a vision chamber.

980-59-150
151

05180

Pavienko, V.A.

Trudy, Nauch-Tekh Obshchestvo Priborstroitel
Prom No.4 96-124 (59)

Apparatus for Automatic Gas Analysis and Mass Spectrometers.

980-55-151
800

05190

Pease, N.H.

Carbide and Carbon Chemicals Corp. Oak
Ridge, Tenn. (55)

Use of the Line Recorder as a Helium Leak Detector

Experiments were conducted with the line recorder main magnet shunted to determine if the He peak could be detected with high enough sensitivity so that He leak testing of cells could be accomplished from the operating floor. Weakening of the magnetic field by means of a shunting piece of iron reduces the voltage needed to resolve the mass 4 peak to a value which may be obtained from the high voltage supply. The tests made show that the He peak could be observed, but even if the sensitivity of the line recorder were increased by all known practical means it could not equal the sensitivity of the G.E. Leak Detector.

443-46-900

05200

Pensa, Pa.

LeVide 1, 4-8, 48-53 (46)

Vacuum Pumps

523-56-151

05210

Peters, J.
Raible, F.

Natl. Symposium Vacuum Technol, 107-9
Chicago (56)

New Helium Mass Spectrometer Leak Detector

A simplified mass spectrometer for leak detection is described which maintains a const. sensitivity level without the periodic cleaning formerly necessary owing to contamination of the ion source. This is accomplished by operating the flat grid ion repeller electrode at a temp. which prevents the formation of a deleterious film in the ion source region. Conduction current heats this electrode to about 1000°, and in addn. the normal pos. repeller potential is applied.

684-57-133
510

05220

Penther, C. J.

Rev. Sci. Instru. 28, 460-3 (57)

Vactroller. A Laboratory Vacuum Controller

Pirani gages are used in an a-c bridge circuit to sense deviation from the set point, and with the aid of a proportional leak valve control the pressure of laboratory-scale vacuum systems over the range of 0.1 to 10,000u of Hg. Pressure fluctuations from the controller action are negligible and stability of $\pm 1\%$ has been obtained over long periods without operator attention. Set point is easily adjustable by panel control knob. Commercial components are used except for the leak valve which is of special construction.

523-57-151

05230

Perkins, G.D.

1957 Fourth National Symposium on Vacuum
Technology Transaction 125-8 (57)

Charpentier, D.E.

A Simple Mass Spectrometer for the Identification of Residual Gases in High Vacuum Systems

A structurally simple double focusing mass spectrometer has been designed as a versatile instrument for the identification of the residual gases in high vacuum systems. The unit is capable of measuring the total pressure of all gases in the system as well as the partial pressure of any gas with molecular weight as high as mass 80. The high sensitivity of the instrument makes it useful as a leak detector, and the mass range allows latitude in the choice of leak searching gases.

997-60-131
144

05235

Perkins, J.C.

Quartermaster Field Evalution Agency
Fort Lee, Va. (60)

An Investigation to Determine a Pratical
Precise and Reliable Method for Detecting
Leaks in Rubber Handwear

This study was conducted to develop a pratical precise and reliable method of inspecting rubber protective handwear under field test conditions. Three methods were tested. They are (1) high definition fluoroscopy, (2) halogen detector and, (3) infrared nitrous oxide analyzer. Each of these methods employs a tracer gas (halogen) and a detector or sensing element. The leak detector tracer gas was found to be the most satisfactory method for making determinations of rubber handwear serviceability.

684-50-151

05240

Persico, E.
Geoffrion, C.

Rev. Sci. Instrum 21, 945 (50)

Beta-Ray Spectrascopes

801-51-115
144

05250

Pfund, A.H.

U.S. 2,573,870 (51)

Manometric Gas Detector

The detector cell contg. the gas to be detected, is sentitive to thermal expansion of the gas induced by infrared absorption.

608-56-153

05260

Phillips, C.S.G.

Phys. Methods in Chem. Anal. 3, 1-28 (56)

Gas Chromatography

Different papers are presented on different aspects of gas chromatography, e.g. Analytical distillation, neutron spectroscopy and neutron interactions in chemical analysis, flame photometry, etc.

980-49-153

05270

Phillips, C.S.G.

Discussions Faraday Soc. No. 7 241-8 (49)

The Chromatography of Gases and Vapors

A simplified arrangement is described and results are presented for the chromatographic analysis of gas and vapor mixts. by employing a carrier gas (N) contg. a const. concn. of a more strongly absorbed material. N obtained from a cylinder through a large buffering vol. is passed through a simple compensating flowmeter, a saturator contg. EtOAc (0°) the column, 3-10 cm tubes with internal diams of 15mm, 8mm, and 2mm, in order, and finally the analyzer, a thermal cond. cell connected to an automatic recorder. Samples are brought on to the column by condensing them in a liquid-air trap through which the N can be passed. The compensating flowmeter and the thermal cond. cell are described in detail. Activated C, carefully sized and dried and 120° is used as the absorbent. A flow rate of 50-100 ml/min appears to be optimum. The method has been applied to the sepn. of various hydrocarbons, ethers, ketones, alcs., and ester. Some data is presented.

378-51-141

05280

Phillips, G.

J. Sci. Instrum. 28, 342-7 (51)

An Electronic Method of Detecting
Impurities in the Air

Impurity concentrations in clean dry air of one part in 10^7 by weight of polar vapours or of one part in 10^4 by weight of non-polar vapours were measured in terms of changes in surface potential of a prepared plate. Changes of potential of the order of 10uV were measured using a vibrating condenser technique and a selective phase-sensitive amplifier. The results suggest that while the adsorption is caused mainly by electrostatic attraction between the dipole and its induced image, a small contribution is also caused by van der Waals attractive forces. The possibilities of obtaining selective adsorption, and some of the practical applications, are discussed briefly.

241-41-100
900

05290

Pickup, L.R.

Gas Age 87, 60, 68, 94 (41)

Investigation and Elimination of Leakage

Original paper reviews methods described in existing literature.

845-60-800

05300

Pierre, J.

Vide V15, No.87 210-19 (60)

Calibration Systems in Vacuum Technique

Analysis of vacuum systems leads to proposed methods whereby greater accuracy in measurement of low pressures may be achieved by careful calibration of vacuum gages and vacuum pumps.

845-60-800

05310

Pierre, J.

Vide, V15 No. 88 313-23 (60)

Fluid Traps in Vacuum Technique

Discussion of traps includes their purpose in secondary vacuum, conditions for efficiency, and covers conical traps, helicoidal traps, rectangular traps, similarity of various designs, combinations with molecular diffusion pumps, and pumping speed reduction coefficient.

980-45-110 510

05320

133 730

150

Electronic Engng. 17 277-80 (44) Dec.
322-26 Jan. 367-71 Feb. 422-26 Mar (45)

Pirani, M.

Neumann, R.

High Vacuum Gauges

A general description of gauges including a section on the principles of vacuum measurement. For the quantitative measurement of low pressure one of the following properties of the substance may be used; (1) weight, (2) electricity, (3) heat conductivity (4) ionization (5) disordered or partially ordered molecular movements of the gas. Typical of (1) is the McLeod gauge and the various models of these are discussed in detail. Gauges based on elasticity either measure the distortion of a solid body under the pressure applied or they determine the time needed for damping of oscillations of a vibrating fibre. Various types of such gauges are discussed. Under (3) come Pirani's hot wire gauge and the Cambridge micro-vacuum gauge-indicator. Various types of ionization gauges are considered e.g. the Pirani Gauge of Brown-Boveri and the Philips gauge. Examples of (5) are Knudsen's gauge and Langmuir and Dushman's molecular gauge.

561-41-800

05330

Pirson, S.J.

Oil and Gas J. 39 21 and 32 (41)

Measure of Gas Leakage Applied to Oil Search

Method described differs from geochemical prospecting. It measures rate at which gas escapes into the atmosphere. Time factor is introduced in measurements-rate of pressure build up in shallow borehole of measured volume, is selectively measured for each of significant gases leaking from accumulation of oil and gas sought.

602-41-800

05340

Pirson, S. J.

Petroleum Engr. V12 No.10 34,36,38 (41)

Geodynamic Prospecting for Oil or Gas

Process described purports to measure surface dynamism of hydrocarbons in subsoil by determining, at surface of ground rate of gas leakage from subterranean accumulations. It is predicted in fact that no rock, even though saturated with water, is completely impermeable to gas under pressure. Theoretical considerations, method of measurements.

241-38-160
441

05350

Pitzer, H.W.

Gas Age 82, 23-4 (38)
Finding and Stopping Leaks

Mentions determining leakage rate, by metering and by measurement of pressure; gas stethoscope, odorization.

980-59-800

05360

Plass, G.N.

Aeronutronic Systems, Inc. Glendale, Calif. (59)

Useful Representations for Laboratory
Band Absorption Measurements.

Three different methods for the representation of laboratory data on band absorption are discussed. Each method is valid over a considerable range of pressure and amount of absorbing gas; together they accurately represent the absorption for virtually all values of these variables by means of reasonably simple mathematical expressions. Since these approximations have a valid theoretical basis, they can be used to obtain reliable values of the absorption for pressures and amounts of absorbing gas outside of the original experimental range. The three methods are; (1) strong line approximation; (2) weak line approximation; (3) non-lapping approximation. Methods (1) and (2) are valid regardless of whether or not the spectral lines overlap. Method (3) is valid regardless of whether or not the absorption is weak or strong at the line centers. The regions of validity of each of these approximations are given for the Elsasser and statistical models.

091-58-154

05370

Pokorny, A.G.

Chem Prdmysl 642-3 (58)

Leakage Control of Pressure and Vacuum
Equipment

For testing leakage of pressure equipment the following gases were suggested; CO₂, HCl, SO₂, and NH₂. The leaking gas was detected by the following indicators; for CO₂, HCl, and SO₂, a mixt. of 100g. 1% alc pheno and 20g. triethanolamine. For NH₂, 100g. 1% alc. phenolphthalein and 20g. triethylenaglycol.

980-59-100
133

05380

Pollard, J.

Reports on Progress in Physics V22 33-73 (59)

Progress in Vacuum Technology

Comprehensive review of advances in vacuum technology during last two decades includes discussion of mechanical pumps, vapor pumps and traps, and gettering and ionization pumps; measurement of pumping speed and pressure are considered; very l-p techniques are surveyed and future trends suggested; brief review of leak detection methods.

043-45-100

05390

Poole, R.

Brit. 568, 236 (45)

Apparatus for Detecting Toxic or Other
Dangerous Gases

This apparatus is particularly adopted for the detection of CO.

801-45-800

05400

Poole, R.

U.S. 2,381,937 (45)

Liquid trap for Gas-Detecting Apparatus

371-48-100
800

05410

Poole, R.

J. Instrn. Elec. Engrs. V95 Pt II 258-74 (48)

The Design, Testing and Calibration of
a Combustible - Gas Dectector

Research into different types of detecting filaments is discussed, particularly platinum, and paladium. The only particular detector discussed is a portable gas detector of the indicating type employing the catalytic filaments cell and single gas chamber. It is for measuring the amount of gas in the air and not for locating source. It measures concentrations as low as 1/50 of 1% by volume.

366-46-154
800

05420

Porter, L.E

J. Chem. Education 23, 402 (46)

Semimicro Detection of Thiocyanate and
Halide Ions.

Chemical reactions and procedures are given for the testing and detection of thiocyanate and halide ions.

801-54-530

05430

Potter, T.W.

U.S. 2,665, 257 (54)

Leak-Detector Composition for Gaseous Fluid
Conduits

A bubble-forming compn. (I) is prepd. which is dissolved in water and introduced into a gaseous fluid, e.g. propane or natural gas, under pressure to detect leaks. Visible bubbles are formed at the point of leakage. In an example, I contains Na dodecylbenzenesulfonate 25-45, a mixt. of 35% dodecyl Na sulfate and 15% Na benzoate or MgCO₂ 20-40 defatted soybean flour 10-30 Na (carboxyethyl) cellulose 1-9, and Na₂SO₂ 5-15 parts. I (2oz) is dissolved in water and injected into a gaseous fluid conduit.

004-60-153

05440

Pratt, G.L.
Purnell, J.H.

Anal Chem 32, 1213 (60)

Sampling Valve for use in Gas Chromatographic
Analysis

A stainless steel sampling valve of small vol, which can be heated to 150° is described. The valve is designed so that it can be operated in vacuo or with column inlet pressures up to 150 lb/sq in.

980-57-110

05450

Praxmarer, W.

Nachrichtentechnik V7 No. 2 61-5 (57)

Considerations on a Thermal Conductivity
Vacuum Gauge

The operation of a thermal conductivity gauge consisting of a spherical negative-temperature-coefficient resistance element supported by thin wires within a glass envelope is treated theoretically and the optimum conditions for the construction of such a gauge for the range of 10^{-3} to less than 10^{-6} mm Hg are deduced. Numerical values are obtained by using a particular element as example.

684-53-140

05460

Pressey, D.C.

J. Sci. Instrum, 30, 20-4 (53)

Temperature-stable Capacitance Pressure
Gauges

A brief theoretical treatment is given of the effect of temperature changes on capacitance pressure gauges. Its use in the design of a sensitive differential pressure gauge of range 0-10 mm of water, having a temperature coefficient of capacitance of only- 100 p.p.m./°C is illustrated.

980-55-620

05470

Price, D.

U.S. Naval Ordinance Lab. White Oak Md.

Lalos, G.T.

Isentropic P-V-T data for Carbon Dioxide
and Nitrogen

Dynamic calibration of the NOL 100,000 psi adiabatic compressor requires known isentropic P-V-T data for one or more gases. This report derives the necessary isentropic data for carbon dioxide and nitrogen. For both gases, and adequate interpolation procedure has been developed for the P-V isentropes. At low pressures (200 atm. and below) an analytical method is used. For higher pressures, numerical interpolation of the data tabulated in this report is used.

378-52-110

05480

150

Pritchard, F.W.

J. Sci. Instrum. 29, 116-7 (52)

A Modified Thermal Conductivity Gas
Analyser for Measuring Methane in Air or
Carbon Dioxide

The use of convective instead of conductive heat transfer from the filament of a gas analyser of the "thermal conductivity" type enables the instrument in some circumstances, to be made insensitive to a third gas component. The principle has been applied to the measurement of methane in N-CO₂-O mixts. Examples of other possible applications are the measurements of CO₂ in the presence of air-methane, air-water vapour or air-hydrogen mixts.

980-47-800

05490

Probst, V.

Belg. 475,762 (47)

Detector for Combustible Gases

The device consists of a heating element which heats a member which is deformed by the increased temp. and which is integral with a small plate of a substance which catalyzes an exothermic reaction of combustible gases. The heat so produced increases the deformation of a deformable member which actuates an indicator.

980-44-121

05500

Rabideau, S.W.

U.S. Naval Research Lab. (44)

Work, G.W.

Thomas, F.S.

Submarine Hydrogen Detectors

1. Indicators, Gas-Tests 2. Submarines-Hydrogen Detection. 3. Mark I (Hydrogen detector) 4. NRL P-2314.

684-42-133

05510

Rainwater, J.

Rev. Sci Instrum 13, 18-22 (42)

A Stabilized Ionization Gage Circuit with Vacuum-Tube Voltmeter

A ionization gage to work from the 10-v. power line is described. High stability is achieved by controlling the gage filament current with a vacuum-tube-operated variable reactance, and the plate and grid voltages with voltage regulator tubes. These regulator tubes also serve to control the voltage to an amplifier tube. The amplifier tube permits the use of a rugged 0-1m.a. ammeter to measure ionization current instead of the conventional microammeter. Provision is made for out-gassing the gage by simply throwing a switch. Provision also made for switching out the stabilizer circuit when it is desired to hunt for leaks by permitting such gases as ether to leak into the system and raise the gage filament activation.

045-55-131

05515

Ramienski, B.
Kulowik, J.

Bull. Acad. Polon. Sci. Classe III 3, 401 (55)

The Adsorption Microelectrode as an Indicator
of Halogens in the Atmosphere

A microelectrode was constructed which could detect halogen concentrations as low as $7 \times 10^{-5}\%$.

374-47-154

05520

Rand McNalley, J.

J. Optical Society of Am. V37 93-8 (47)

Spectroscopic Quantitative Analysis

Investigations aimed at developing methods of spectrographic quantitative analysis of the halogens and non metals have been carried out, with emphasis on analysis for fluorine. The relative sensitivities of fluorine spectrum lines in the vacuum ultraviolet region and in the visible region were studied.

684-62-112

05530

Rasmussen, R.A.

Rev. Sci. Instrum. 32, No.1 38-42 (62)

Application of Thermistors to Measurements
in Moving Fluids

Quantitative considerations of the effect of fluid motion on the cooling of self-heated thermistors are essential to their efficient application in many instruments. The investigations reported here were undertaken for the purpose of ascertaining these effects and obtaining useful expressions with which to describe them. Expressions for the time constant sensitivity and dissipation factor are derived, and their significance is demonstrated in qualitative considerations of practical instrumentation problems.

980-47-154

05540

Reali, A.

Ital, 424, 581 (47)

Process and Apparatus for the Crystallization
of Extremely Small Crystals from Salt Solutions

The difficulties encountered in sepg. tiniest crystals from the mother liquor are overcome by very rapid cooling and violent agitation of the satd. salt soln in a crystallizer consisting of 1 or several vertical crystn. tubes into which a cold gas or a mixt of cold gases (air) is blown. The lower ends of the tubes are joined to a cyclone separator open at both ends. The pasty crystal mass sepd. at the bottom of the cyclone is collected in a tub, while the cooling gas is sucked into the chimney.

364-53-151

05550

Redhead, P.A.

J. Appl. Phys. 24, 331-7 (53)

Crowell, C.R.

Analysis of the Linear Radiofrequency Mass
Spectrometer

The linear radio-frequency mass spectrometer described is analyzed for small signal operation. The results are obtained in a closed form for any entrance phase where previously only a graphical solution for an optimized entrance phase was obtained. Expressions for resolving power and current efficiency are derived for both sine-wave and square-wave operation. It is shown that, although high resolving power may be more readily obtained with square-wave operation, the product of resolving power and efficiency is approx. the same for sine or square waves. Loss of resolving power caused by the thermal energies of the ions is shown to be less troublesome with square-wave operation.

980-52-114

05560

130

151

Reimann, L.

Chapman and Hall, London (52) Dept of
Physics. U. of Queensland in Eng.

Vacuum Technique

Many leak detecting schemes are mentioned. Some of these are: Painting with gases; thermionic method; Alphasatron gauge; compressed air; hydrogen gauge; mass spectrometer; Philips vacuum-meter; positive ion detector; test-coil tester. No details are given and the material will not be of much interest for that reason to the problem of open pipe leak detecting.

980-40-110

05570

Rein, H.

Schr. dtsh. Akad. Luft f-Forsch II (40)

On Oxygen Determination by Physical Means

For determining the O contents in the atmosphere in the cabin of high-flying aircraft or submerged submarines, a new method has been developed, making use of the change of heat conductivity of a paramagnetic gas subjected to a magnetic field. Two Pt-Ir wires of 0.01 mm dia. and 3 cm. length enclosed in cells are heated by a current and their resistances are compared by a Wheatstone bridge. Both heating wires lie in the flow of the gas to be tested. If one of the cells is magnetized the heat conductivity is reduced and the galvanometer shows the change of resistance. It is calibrated according to the O cone, and the accuracy is claimed to be 0.01%.

008-51-151

05580

Reinders, M.E.
Schutten, J.
Kistemaker, J.

Appl. Sci. Res. B2 No.1 66-70 (51)

Leak Detection with a Mass Spectrometer
Using Hydrogen Gas.

The use of hydrogen gas as a test gas in leak detection with a leak-detecting mass spectrometer is discussed. The sensitivity of our instrument is found to be one part of hydrogen gas in 104 parts of air, this being five times less than for helium.

081-53-133
510

05590

Reis, T.

Cahiers de Phys. No.46 59-62 (53)

Note Concerning the Detection of Leaks
by Means of a Pirani Gauge

The use of a Pirani gauge as a manometer for evacuated systems is based on the change in temperature of a heated metal filament, which varies with the pressure and the thermal conductivity of the surrounding gas. The gauge can be calibrated, for a given gas, by introducing the gas into the system through an artificial leak. Hydrogen, owing to its high thermal conductivity, was found to be most suitable. Details of apparatus, calibration and two examples of leak detection at different pressures, are given.

612-53-180

05595

Rentore, P.H.

Power, 97, 149 (53)

Finding Condenser Air Leaks by Easy Method

Carbon Tet. is sprayed on joint to be tested. Detector in the form of a small burner arranged to pull primary combustion air through tube. The tube is placed in air-exhaust line and if there is a leak, the burner burns bright green. Prest-o-Lite Halide Detector.

763-45-900

05600

Rentschler, H.C.
Henry, D.E.

Trans. Electrochem. Soc. (45)

Lowering of the Photo-Electric Work Function of Zirconium, Titanium, Thorium and Similar Metals by Dissolved Gases

Describes experiments which show a photo-electric threshold shift towards the longer wavelength due to the interaction of O_2 , N_2 , of H_2 with Zr, Ti, etc. The results indicate that the lowering of the photoelectric work function is caused by the formation of a solid solution of the gas in the metal.

980-44-151

05610

Reutersward, C.

Arkiv. Mat. Astron Fysik 30A No. 7 (44)

A New Mass Spectrograph

A preliminary notice of a mass spectrograph in which the ion beam falls obliquely on the resolving magnetic field. The entire spectrum from H to U can be obtained in three exposures. The theoretical resolving power of 4400 was reached in preliminary expts.

684-56-151

05620

Reynolds, J.H.

Rev. Sci. Instrum. V27 No 11 928-34 (56)

High Sensitivity Mass Spectrometer For
Noble Gas Analysis

A high-sensitivity mass spectrometer is described in detail. Ultra-high vacuum techniques have been used throughout so that small rare gas samples can be closed off within the spectrometer envelope and analysed statically. This procedure is of considerable advantage in analysing argon and lighter rare gases. The background spectrum when the spectrometer pressure is 5×10^{-10} mm Hg. is described. Sensitivity data are presented. The detectability of the instrument for Xenon atoms (any isotope) is 0.5×10^6 atoms; for A 36 the detectability is 14×10^6 atoms.

762-48-140

05630

Richardson, R.D.

Trans. Amer. Soc. Mech. Engrs. 70, 211-16 (48)

Continuous Determination of Oxygen
Concentration Based on the Magnetic
Properties of Gases

Almost every process dealing with heat and gas reaction can be improved by the knowledge or detection of oxygen at some point in the cycle. In consequence a new instrument named "Magno-therm" has been developed for the continuous analysis of industrial gases for oxygen concentration, which should prove to be of universal application. It operates by the change in paramagnetism of oxygen with temperature, and therefore its readings are not disturbed by any extraneous gases except some of the oxides of nitrogen. The theoretical basis for this analyser is discussed, and a description given of the operating characteristics whereby the electrical impulse is picked up directly and measured on a recording bridge, a response of about 3mV for 1% O being obtained. The instrument contains no chemicals or mixing orifices and is free of moving mechanical parts.

684-51-800

05640

Riddiford, L.
Coe, R.F.

J. Sci. Instrum. 28, 352-3 (51)

Leaks in Vacuum Liquid-Air Traps

Stainless steel liquid-air traps show leakages which are due to minute holes and not to refrigeration stress. The allowable leak-rate in these traps is of the order of 1% of the leak-rate in the rest of the vacuum equipment.

684-41-133

05650

Ridenour, L.N.

Rev. Sci. Instrum. 12, 134-6 (41)

Magic Eye Ionization Gauge

043-38-154

05660

Ringrose, H.T.

Brit. 494,882 (38)

Devices for Detecting Posionous Gases, etc.
in the Atmosphere

These comprise a combustion chamber in which the air is subjected to heat by an elec. filament or a spirit lamp and a test chamber in which the products of combustion act on a test paper or like indicator. A paper treated with starch, KI and KIO_2 is capable of indicating the presence of all gases that yield Cl or SO_2 as combustion products.

684-46-133
510

05670

Rittner, E.S.

Rev. Sci. Instrum 17, 113-4 (46)

A Pirani Gauge for Use at Pressures up to
15 mm.

801-51-800

05680

Rivers, H. M.

U.S. 2,549,388 (51)

Apparatus for Determining the Gas and Solids Concentration in Steam.

980-41-620

05690

Roberts, J. K.

Phys. Soc. 7, 303-28 (41)

Interactions of Gases with Metals and Crystalline Solids.

377-60-800

05700

Roberts, M. W.

J. Roy. Inst. Chem. 84, 275-82 (60)

High - Vacuum Techniques

684-57-151

05710

Robinson, C. F.

Rev. Sci. Instrum 28, 777 (57)

Second-Order Abberations in a Modified Mattauch-Type Mass Spectrometer.

684-58-151

05720

Robinson, C.F.

Rev. Sci. Instrum. 29, 622-4 (58)

Mass Spectrometer Image Displacements Due to 2nd Order Aberrations

The article is concerned entirely with a mathematical model or description of 2nd order aberrations. The discussion assumes a double-focusing resolving system and defines various functions in terms of this system; the optic axis being defined, for example, as a power series involving parameters of displacement from the main ion beam. Dispersion surfaces are discussed after Mattauch. This Mattauch resolving system involves the various parameters in terms of the energy at various positions from, say, the ion slit to the beam end. Attempts are made to discuss the center of gravity of the ion beam itself corresponding to an intrinsic error in the mass measurement. This material could find use when a system of leak detection is established.

247-46-113

05730

Robinson, H.
Flanagan, M.C.

Gen. Elect. Rev. 49, 42-4 (46)

Thermocouple Vacuum Gage

Utilizes variation of thermal conductivity of gas with pressure at low temperatures. A standard heating current is passed through a wire in the gas, and the equilibrium temperature of the wire measured by a thermocouple, connected mechanically but not electrically to the wire. The higher the pressure, the higher the conductivity of the gas and the lower the thermocouple reading. The instrument covers the range 0-200 microns, is direct-reading and may be used to give remote indications. By comparison of readings with those of a McLeod gauge, the partial pressure of condensable gases may be estimated.

841-60-620

05740

Robinson, N. W.

Vacuum V10 No 1-2 75-80 (60)

Action of Mo, W, Ta, and Mi on Residual
Gases in Vacuum System

Metal-residual gas interactions in vacuum system studies by flash filament and mass spectrographic techniques; main reaction involves CO and Mo and Ta; it was found that residual CO is decreased below, and increased above critical flash temperatures; effect of sputtered and evaporated metal films on glass also discussed.

004-52-154
220

05750

Rockland, L.B.
Lieberman, J.
Dunn, M.S.

Anal Chem. 24, 778-82 (52)

Automatic Determination of Radioactivity
on Filter Paper Chromatograms

An automatic sample changer was developed to permit the rapid survey and accurate counting of filter paper chromatograms with the aid of two types of recording counters and other standard apparatus for the determination of radioactivity. Examples are given of radioactive counts made of glycine-2-C14 spotted at five concentrations on Whatman No. 1 filter paper and of a typical phenol-developed test tube chromatogram of glycine-2-C14 spotted at the origin was $85 \pm 6\%$. The R value (0.48) of a chromatogram stained with ninhydrin coincided with that estimated from the peak of the radioactive curve. This apparatus may be employed to measure radioactivity of compounds containing higher energy, as well as carbon, radioisotopes on one- or two-dimensional chromatograms.

443-51-143

05760

Romand, J.
Schwetzoff, V.
Vodar, B.

Le Vide 6, 1046-51 (51)

Application of Optical Absorption in the Far Ultraviolet to Leak Detection in Vacuum Apparatus and to the Measurement of Low Pressures

An apparatus measuring absorption in the Schumann region (1850 to 1200 Å) is illustrated and described. The use of the equipment in measuring air pressures down to 5×10^{-4} mm Hg and leaks, using benzene as a tracer, of 5×10^{-9} liter/sec is reported.

980-51-143

05770

Romand, J.
Schwetzoff, V.
Vodar, B.

Congr. Groupement Avance, methodes anal spectrograph, produits met 14, 201-19 (51)

Possibilities for the Utilization of Schumann Ultraviolet Absorption Spectra for the Detection and Determination of Gases, Application to the Detection of Leaks, in Vacuum Apparatus and the Measurement of Low Pressures

Optical absorption in the region 2000-1250Å provides a means of measuring rapidly and precisely the density of air in a wind tunnel since O absorbs strongly around 1450Å. The method does not depend on the rate of gas flow and can provide a measure of the mean pressure perpendicular to the air streams without perturbing them. The strong absorption of benzene at 1790Å can be used to search for leaks. The photomultiplier used has a Pt cathode for which the threshold is about 2000Å. The app. consists of a H lamp with a fluorite window, and the receiver, whose window is blown from quartz of high purity. The source and receiver are connected by a brass tube to which are attached the pumping station and the object to be tested. The amplifier used has a gain of 2×10^8 and max. deflection of the microammeter occurs for 50 microamperes. The measurable pressure range is varied by changing the length of brass tube. For the limits 0-400 microamperes the respective pressure limits are $76 - 5 \times 10^{-5}$ cm Hg. It is calcd. that the smallest detectable leak would correspond to a current variation of 4 microamperes and show a pressure increase of 4×10^{-6} mm Hg/sec in a one-liter vessel.

375-51-143

05780

Romand, J.
Schwetzoff, V.
Vodar, B.

J. Phys. Radium 12, 633-4 (51)

Some Considerations on the Detection of
Gases and the Measurement of Their Pressure
by Light Absorption in the Far Ultraviolet

The method is described and examples of its practical applications given, e.g. detection of leaks in apparatus and measurement of low pressures.

980-46-148
800

05790

Romankov, P. G.
Grigor, V. A.

Trudy Leningrad Tekhnol Inst. im
Leningradskogo Soveta No. 12 175-83 (46)

A New Type of Automatic Device for Signaling
the Presence of Gases in Air

Air is passed through a pyrolysis chamber and then around a transparent "indicating film". Light passes through this film to a photocell; changes in the photocell reading actuate a signaling device and controls. The device responds within 2 min. to 0.004 mg/l of Br and within 15-30 sec to 5-80 mg/l of Et Cl.

090-59-148

05800

Rosik, L.
Vilim, O.

Chem Listy 53, 757-71 (59)

Simple Photoelectric Apparatus for
Measurement of Light Scattering.

A simple and low cost appl. is described with efficient intensity compensation of the Hg arc. The operation and reproducibility of the app. was verified by the particle size detn. of a series of monodisperse latexes.

980-57-151

05810

Ross, G.N.

Brit. Chem Engr. 2, 614-19 (57)

Mass Spectrometer

The mass spectrometer is compared with other gas analysis techniques such as vapour phase gas chromatography, infrared spectrometer ultra violet spect. and low temp distillation equipment. The m.s. has a full range but CO and N₂ are not determined independently. The author contends that gas chromatography may supplant the m.s. The main reason is that the human skill required for V.P.G. analysis is much less than that required for m.s. Five or six runs are necessary for complete analysis of the most complex sample. V.P.C. is poor for impurity detection in routine samples. Operator manipulation time high compared with m.s. greater chance for human error. Some of the above facts seem to indicate that vapor phase chromatography might be more useful on easier to utilize than a cumbersome mass spectrometer for leakage detection in some manner. Perhaps an instrument utilizing V.P.C. could be constructed small enough and quantitative enough for use.

527-47-800

05820

Rostagni, A.
Filosofo, I.

Nuovo, Cim. 74-84 (47)

Compensating Radiometric Vacuum Meter

The behaviour with different gases is here reported, and curves are given. A pressure of maximum sensitivity exists for each gas, which approx. infinity the mean free path at N.T.P. in the gas. At low pressures all the gases behave similarly, small differences being due to accommodation coefficients and adsorption of the molecules on the walls.

685-43-800

05830

Rostagni, A.

Ric. Sci. 14,416-21 (43)

Universal Vacuum-Meter

Various types of vacuum - meters are discussed. An instrument is described and illustrated, using a suspended Al foil whose deflection opposite a heated Al plate may be gravity-compensated by tilting the tube in which the foil is suspended about a conical connection to the vacuum chamber. The instrument is reliable at pressures from a few torr. to 10^{-7} torr.

980-46-800

05840

Rostagni, A.
Bassi, P.

Atti Accad Naz Lincei i, 960-4 (46)
Filament Radiometric Vacuum-Meter

A glass fibre of diameter 1 to 10^{-3} mm is used in place of the Al foil. The arrangement is illustrated. Curves showing the variation of angle of inclination of the tube with pressure over the range 10^{-3} to 50 torr for various currents in the heated plate and for various thicknesses of fibre are given. The behaviour in air and H is discussed.

323-55-900

05850

Rothfus, R.R.
Morrad, C.C.

Ind. Eng. Chem V47 1144-9 (55)

Turbulent Velocities For Tubes, Etc.

This is an article on the correlation of turbulent velocities for tubes and parallel plates.

997-59-620

05855

Devienne, F.M.
Roustan, A.F.

Contract AF 61 (514) 1126

Use of the Revolving Arm Method for the
Determination of the Stagnation Temperature
in an Ionized Gas.

The use of the revolving arm method with regard to the determination of phenomena which occur during the displacement of a body in an ionized atmosphere is described. By means of this method it is possible to carry out measurements on ionized gases which have a relatively strong ionic predominance. Measurements can be made of the state of ionization of the gas and the influence of the displacement velocity of a body on the recombination rate of the ions on the surface of the moving body.

980-39-510

05860

Rudolph, G.

Zeits f Physik 111, 7-8 535-35 (39)

Differential Manometer for Very Small
Pressure Differences

A differential manometer is described which depends upon the change in resistance of a wire with the pressure of the gas in which it is placed.

082-57-133

05870

153

Ryce, S.A.
Bryce, W. A.

Can J. Chem. 35, 1293-7 (57)
Ionization Gage Detector for Gas
Chromatography

An ionization gage has been modified to serve as a detector for gas chromatography. A small fraction of the effluent gas from the column is diverted into the gage through an adjustable leak. The gage is operated under conditions such that ionization of the eluted compd. only occurs and not of the He carrier. The ion current is amplified and displayed on a pen recorder. The gage combining very high sensitivity and rapid response with almost complete independence of changes in flow rate pressure or temp.

524-57-133
153

05880

Ryce, S.A.
Bryce, W.A.
Szekely, G.
Feyes, P.

Nature, 179 541 (57)

Ionization Gage Detector for Gas
Chromatography

Development of a high-sensitivity ionization gage detector for gas chromatography, which makes use of the fact that the ionization potential of the He carrier gas is very much greater than that of most other volatile substances, is reported. Assocd. with the gage is an adjustable metal leak which permits a portion of the carrier gas stream from the column to flow through the gage components of a R.C.A. 1949 ionization gage with a modified envelope. A sensitivity of at least 200 times that of a thermistor type thermal cond. cell is claimed.

609-55-158

05890

Sakamoto, M.
Kobayashi, S.
Ishii, S.

Phys. Rev. 98, No.2 552-3 (55)

Effect of Oxygen Gas on the Photo-
Conductivity of BaO

The peak photoconductivity response of a BaO cathode coating for $h\nu = 3.7\text{eV}$ decreases rapidly with introduction of oxygen into the vacuum system and suggests this response is due to surface states.

980-60-800

05900

Saksena, G.D.
Wiggins, T.A.
Rank, D.H.
Skorinko, G.
Birtley, W.B.

Spectroscopy Lab. Penn State U. (58-60)

Technical Report (58-60)

Seven papers given on different items under spectroscopy e.g. %-meter vacuum spectrometer, vibration-rotation spectra of HCN, pressure shifting of spectrum lines and precision measurements of the wavelengths of infrared absorption lines.

165-56-620

05910

Salceanu, C.
Bojin, S.

C.R.Acad. Sci. V243 No.3 237-9 (56)

The Thermal Conductivity of Gases
and Vapours

A hot-wire method is used and is briefly described. The results are obtained relatively to that for H₂ and figures are given for carbon dioxide, air, and an oxygen-hydrogen mixture. Wires of Cu, Ag, Ni, and Fe have been used, the diameter ranging from 0.05-0.2mm. Plots of results at different temperatures meet at a point on the negative side of the axis. This intercept is considered to be due to heat losses from the ends of the wire and depends on the history of the wire as well as on its conductivity.

980-45-800

05920

Samuel, A.J.

Tenn. Eastman Corp. Oak Ridge, Tenn. (45)

Vacuum Probe, Standard Leaks and Needle
Valve for use with the Helium Leak Detector

Part I of this report deals with the development and use of a vacuum probe for leak hunting with the He leak detector. Part II describes two types of standard leaks, one adjustable, the other fixed, which were designed for measuring the sensitivity of the He leak detector by the two leak method. Both types have been proved satisfactory in laboratory and plant tests. Part III deals with the development of a needle valve with fine adjustment for controlling the flow of a standard mixture of He and air into the leak detector for a sensitivity check by the single leak method. Part IV describes a worm and gear adjustment developed for use with the 3/8" Kerotest angle valve to facilitate throttling of the He leak detector on a vacuum header equipped with this valve.

980-60-800

05930

Sanders, A.D.

General Electric Co. Owensboro, Ky. (60)

Air Force Inline Exhaust Machine PtI

The design, development, and application of the receiving tube inline exhaust machine is described under the following major groups; (1) a general description of the equipment and an operating instruction book; (2) a report on preliminary design work and development of the vacuum equipment and a prototype machine; (3) a report on system performance evaluation tests performed during five consecutive days of operation; and (4) a detailed description of process experiments performed on both the prototype equipment and the machine, together with life test results, for receiving tube type 5654.

980-61-800

05940

Sanders, A.D.

General Electric Co., Owensboro, Ky. (61)

Air Force Inline Exhaust Machine PtII

Modifications in the receiving tube inline exhaust machine are described. Changes were made in the pre-heat and tip-off unit, the leak detection system, the induction heaters, and the ovens, to obtain significant improvements in the performance of the machine. Life test experiments on the 6005 indicated that the outgassing characteristics of this tube impose a basic limitation of the residual gas level that may be attained by any practical process schedule. The degree of outgassing attainable within the present operating limits of the machine is controlled primarily by the complex desorption characteristics of the tube structure acting in combination with pumping restrictions due to the tubulation and micas. Variations in process parameter levels over a broad range seemed to have very little effect on the total amount of gas evolved. The life tests on the 6005 tubes indicated some improvements due to the inline exhaust process but the results were not as encouraging as had been expected. Description and tests on tube type 5902 is included.

524-54-132
800

05950

Sasaki, N.
Onchi, M.

Nature 174, 84-5 (54)

Effect of Vapours of Halogen Compounds on
the Emission of Positive Ions from Pt.

Experiments on the Rice effect (44) are described. These lead the authors to suggest that the Rice effect may be due to the production of some new species of positive ions in some way by a surface reaction between O_2 and vapours of halogen compounds which seem to be related to the presence of alkali ions.

095-56-900

05960

Saville, B.

Chem and Industry 660 (56)

Novel Analytical Applications of Reactions
Depending Upon the Positive Halogen
Character in Alkane Sulfonol Halides

This article is about chemical reaction observed in the laboratory by adding chemicals together. Colors of solutions are observed and thiolgen is detected in the solutions with a Spekker absorptiometer by reference to a calibration curve.

524-56-111

05970

Saxena, S.C.

Nature V178, 1462 (56)

Thermal Conduction and Gas Analysis

The well known hot-wire method devised by Daynes and Shakespeare has not been applied in a manner free from objection. A procedure is outlined which aims to eliminate or make easily calculable the following corrections: wall effect - calculated to be small or negligible according to the gas; convection-eliminated by cell design; radial flow; - the only factor requiring calibration; radiation - a fixed correction; temperature drop - negligible in the pressure range 6-20 cm Hg.

980-57-153

05980

Schay, G.

Hu Hsueh Hsueh Pao 23, 421-7 or
(Eng)
427-37 (57)

Determination of Adsorption Isotherms of
Gases by Frontal Chromatography

A new method is used to det. the adsorption isotherms of gases and gas mixts. The basis of the method lies in the measurement and comparison of the rates at which the various gases enter and leave the adsorption system.

103-39-133
510

05990

Scherer, M.

Comptes Rendus 208, 426-7 (39)

Pirani Gauge

Difficulties are indicated in the use of the Pirani gauge for sensitive work. By making various modifications in the apparatus its sensitivity is considerably increased, and a deflection of the spot of light of 10mm for a variation in air pressure of 10^{-7} mm is obtained.

323-53-610

06000

Schlenger, W.G.
Sage, B.H.

Ind. Eng. Chem. 45, 657-61 (53)

Material Transfer in Turbulent Gas Streams

Data on turbulent mixing in a tube of natural gas and air as a function of the radial distance from its axis are correlated by a theoretical relation between the mole fraction of natural gas and the function $E(d,r)y/U$ where $E(d,r)$ is eddy diffusivity referred to the radial direction, y the axial distance, and U the gross velocity.

962-56-110

133

510

06010

Z. angew Phys. V8 No. 5 216-7 (56)

Schlitt, H.

A Thermoelectric Vacuum Gauge

Range 10^{-2} to 1mm Hg. The construction is described in a calibration curve, alongside that of a pirani gauge, is given. The cold junction is in good thermal contact with the glass envelope of the gauge and the hot junction lies inside a heating coil wound on a glass capillary tube. The e.m.f. is approximately 1 mV at atmospheric pressure and 12 mV in vacuo for a heating current of 5 mA.

004-60- 110

153

Schmauch, L.J.

Dinerstein, R.A.

06020

Anal. Chem. 32, 343-52 (60)

Response of Thermal-Conductivity Cells in Gas Chromatography

To understand better the performance of thermal-cond. cells as detectors in gas chromatography, theoretical and exptl. studies were made of the response of cells to changes in gas compn. and operating temps. An equation for response was derived for cells in which most of the heat is conducted through the gas. Response was considered as the product of 2 factors; a cell factor, which depends on the operating conditions including elec. parameters of the cell and bridge; the other, a thermal-cond. factor, which depends on the difference in cond. of the carrier gas and the gas mixt. passing through the cell when a component is eluted. Expt. results show that when there is a large difference in cond. as in the case of org. components in He carrier gas, response is approx. linear and only a single calibration factor is required for quant. analysis at a given operating temp. When the difference is small, as in the case of org. components in N₂ or H₂ in He response is less linear, and calibrations covering the concn. range are necessary. This paper is an elaborate theoretical treatment of the subject matter including derivations of equations for detector response and a study of the factor effects on the over-all responses.

980-56- 153

06030

Schols, J.A.
Dijkstra, G.

Revue. Trav Chim. V75 965-76 (56)

Multiple Gas Chromatographic Apparatus for
Use at Temperatures up to 250°

Four electrically heated stainless steel columns, each with a Pt wire thermal cond. detector are combined in a single apparatus provided with a four part strip-chart recorder. Paraffin oil, paraffin wax, polythene, and silicone oils were found to have components volatile at 200°. Constructional details are given.

617-48- 151

06040

Schor, H.

Product Engineering V19 No. 1 81 (48)

Peacetime Benefits from Military Research

Deals with a mass spectrometer with a helium probe.

980-58- 153

06050

Schuhkuecht, W.

Arch. Eisenhüttenw 29, 101-6 (58)

Gas Chromatographic Analysis

Chromatographic gas analysis is based on the selective adsorption and desorption of gases on solid adsorption agents, or on their different solubility in liquids. Three different methods have been developed; the frontal analysis, in which the chromatographic column is saturated with the gas mixture to be examined, the displacement analysis in which only a small amount of the gas mixture is adsorbed on the filling of the column and the constituents are then dissolved by means of an auxiliary gas with high adsorption affinity to the filling, and the now predominantly applied elution method in which the gaseous or vaporous sample is sent with a carrier gas of low adsorption affinity through a chromatographic column. After a detailed description of the 3 methods and the apparatus used several practical samples from foundry, coking, and metallurgical processes are given. The carrier gases for the samples are mostly He, Ar or N₂. As the detection sensitivity for a given substance depends, under specified testing conditions, on the difference between its heat conductivity and that of the carrier gas.

166-43- 900

06060

Schulze, W.

Electrotech n Maschinenbeu 61, 593 (43)

Technical Question of Vacuum in the Field of
Current Rectification Technique

Methods of producing a high vacuum and calculation of the relationships between the pumping power and the resistance to flow in lines at low and high pressures are briefly discussed. Another method of detecting for leaks consists in filling the vessel with NH_3 under high pressure and then wrapping it in a cloth impregnated with a colorless Hg compd, which becomes discolored upon contact with NH_3 .

096-58- 800

06070

Schumacher, E.

Chimia 12, 245-6 (58)

Simple Sensitive Device for Leak Testing of
Vacuum Apparatus

A description is given of an app. for leak testing in which the Pd membrane of the Nelson leak tester is replaced by a liquid-H trap. The sensitivity of this app. closely approaches that of the more expensive He leak detector.

004-59- 153

06080

Schmauch, L.J.

Anal. Chem. 31, 225-30 (59)

Response Time and Flow Sensitivity of De-
tectors for Gas Chromatography

Procedure, equipment, and equations for evaluating gas chromatographic detectors through measurements of flow or pressure sensitivity and response time are described. It is concluded that response time influences peak height and affects band broadening and symmetry. Band asymmetry can be produced by diffusion-type detectors. Adequate representation of band shape is obtained where the v/c ratio is 0.2 or less. For sharp bands appearing early in a chromatogram where a is 5 sec. the response there should be about 1 sec. Faster responses will not improve detection unless the speed of assocd. equipment is also improved.

684-60- 610

06090

Schwarz, H.

Rev. Sci. Instrum. V31 No. 4 433-8 (60)

Forced Periodic Changes of Kinetic Energy of
Gas Molecules as Means of Vacuum Measurement

Method of measurement utilizing fact that gas molecules in container under pressure may impinge on solid surface, temperature of which can be made to change periodically; frequency of this change is made equal to mechanical resonant frequency of membrane held at constant low temperature; membrane will vibrate up to large amplitudes when hit by gas molecules coming from periodically heated surfaces; amplitude is measure of gas pressure.

008-47- 142

06100

Schwarz, N.

Appl. Sci. Res. A1 No. 1 47-54 (47)

Analysis of Gas Mixtures Containing a Para-
Electric Component

A method of gas analysis is described which makes use of the influence of an electric field on the heat transfer from a wire. The method, which is especially suited for the determination of the NH_3 content in mixtures with air and, under certain limitation, with H_2 and N_2 , is fully automatic and continuous and can be made self-registering. A possible application to the measurement of humidity is briefly touched upon.

845-59- 900

06110

Schweitzer, J.

Vide V14 No. 82 165-82 (59)

Reflexions sur l' ultra-vide

Ultrahigh vacuum; need for large equipment capable of operation below 10^{-8}mm Hg leads to considerations of production of complex mechanical units; survey indicates preponderant influence of surface phenomena as limiting factor in particular case of gas influx and evolution; maintaining pumping speed at very low pressures subordinated to vacuum limit of pumps; Knudsen equation expressing conductance of duct is required to account for influence of sticking time of adsorbed particles.

980-44- 800

06120

Schuler, W.
Meier, R.

Helv. Physiol Pharmacol Acta 2, C10-11 (44)

A New Vessel for the Manometric Determination of Two Gases by the Warburg Paired-Flask Method

A new type of flask with several compartments for use in the Warburg app. is shown.

004-57-132

06125

Schultz, H.A.

Anal. Chem. 29, 1840-2 (57)

Measurement of Concentrations of Gaseous Halide Tracers in Air by Positive Ion Emission Techniques

Freon 12 is a promising tracer for atmospheric diffusion studies. It is an odorless colorless gas, noncorrosive and nontoxic in the concentrations that are required. This gas can be measured in air in concentrations as low as 0.1 ppm. by special techniques involving the use of a modified version of a halogen leak detector available commercially. The feasibility of this approach has been demonstrated by field tests illustrated herein and described more fully elsewhere. Current studies on the mechanism of operation are briefly outlined.

684-39- 133

06130

510

Scott, E.J.

Rev. Sci. Instrum. 10, 349-50 (39)

Automatic Pirani Vacuum Gauge

Describes an instrument consisting essentially of a Pirani gauge and a vacuum-tube ohmmeter and which indicates the pressure automatically on a calibrated galvanometer scale. Since the resistance of a fine wire in a partially evacuated system is a function of the pressure, the measurement of this resistance is therefore a measure of the pressure. In the present instrument the resistance is measured by feeding the voltage drop across it onto the grid of a triode tube. As the resistance varies in accordance with changes in the pressure of the gas, the voltage-drop across the resistance, and hence on the grid of the tube, will also vary. This allows the pressure to be read directly on the calibrated scale of a galvanometer contained in the plate circuit.

485-58- 153

06140

Scott, R.P.W.

Mfg. Chemist. 29, 517-22 (58)

Recent Developments in Gas Chromatography

High-efficiency gas chromatography columns, capillary columns, high-temp. chromatography, analysis of wide-boiling range samples, large-scale preparative columns, automatic gas-liquid chromatography equipment for plant control, and application of gas-liquid chromatography to specific problems are discussed.

966-49- 620

06150

Senftleben, H.

Z. Phys. 125, No. 7-10 629-52 (49)

Gladisch, H.

Heat Transfer in Gases Between Coaxial Cylinders

In investigating the effect of electric fields on the heat transfer in gases it was found necessary to examine the heat transport conditions between coaxial cylinder. For $R-r$ and small values of the Grashof number the Nusselt heat transfer functions and the position of the centre of gravity and the temperature of the flow are obtained for the case of free flow. The tests were carried out with a thin Pt wire in the axis of a glass tube filled with the gas under investigation. The wire is connected in a Wheatstone bridge, the current for the measurement serving as the heating current.

962-50-800

06160

Senftleben, H.
Gladisch, H.

Z. angew Phys 2 No. 5 204-5 (50)

Analysis of Gases by Electrostriction Method

Describes a method of determining the composition of mixtures of gases, based on the cooling effect of gas currents caused by electrostriction. The apparatus used is suitable for both single measurements and continuous recording.

801-49- 153

06170

Shepherd, G.M.

U.S. 2,487,077 (49)

Colorimetric Gas Detection

CO is detected in air by passage over SiO_2 gel impregnated with $(\text{NH}_4)_6\text{Mo}_7\text{O}_{24} \cdot 4\text{H}_2\text{O}$ and PdSO_4 . The air must be dried before contact with the indicator. The indicator maintains its sensitivity down to a temp. of -40° . The CO can be detected with reproducibility of 2 p.p.m. by vol. The indicator's color develops, on reaction with CO, from clear canary yellow through a bright emerald green to a clear blue-green, ending with a clear dark blue. The prepn. of silica gel, PdSO_4 soln. molybdate soln. and the proper combination of these is described in detail.

996-56-220

06175

Sherman, H.

N.Y.U. College of Eng. N.Y. (56)

Negative Ion Effects in Halogen Quenched Geiger Counters

Using pulsed X-rays as a source of ionization, measurements of time lags have been made in Geiger counters filled with the following gases, neon and chlorine, neon, argon, and chlorine, argon and iodine; neon and iodine; and krypton and iodine. The values of time lags observed range from 13 to 0.3 microseconds depending upon the concentration of halogen gas in the counter and overvoltage. It is shown that the delays cannot be due to negative ions, but are probably caused by the relatively long time that it takes for the halogen molecules to de-excite the noble gas metastables formed in the avalanche. Contract AF 18(600) 1460.

004-56-154

06176

Shiner, V. J.
Smith, M. L.

Anal. Chem. 28, 2028 (56)

Rapid Argentimetric Determination of Halides
by Direct Potentiometric Titration.

684-52- 153

06180

Sibata, H.
Tuzi, Y.
Kumagai, H.

Rev. Sci. Instrum 23, 54-5 (52)

A New Circuit for Ionization Vacuum Gauge

The object is to measure directly the ratio of ion current to electron current, obviating the necessity for keeping the latter constant. The circuit, in which two triodes are employed, saves maintenance, improves the speed of measurements and is highly sensitive.

165-53-133

06190

Sibley, C.B.
Roehrig, J.R.

Electronics 26, 176-7 (53)

Wide-Range Vacuum Gage

Covers range 10^{-4} - 10^3 mm Hg in six linear ranges and in an extension of the Downing gauge. The output signal is produced by the collection of ions formed by a constant flux of α -particles from a radium source. Two collecting ionizing chambers are used depending on range, the ion current amplified by a factor of 10^7 and indicated on meter and recorder. Contamination of electrodes is negligible as low-voltage collecting field is used. Non-Linearity limiting the use of previous gauges has been excluded without sacrificing inherent advantages. Data is given on the sensing element, the Roberts d.c. amplifier and the complete circuit.

684-62-133

06200

Sikorski, M.E.
Andreatch, P.

Rev. Sci. Instrum. 33 No. 2 155-60 (62)

Tunnel Diode Hydrostatic Pressure Transducer

A very sensitive hydrostatic pressure transducer was made using a silicon tunnel diode. The transducer consists, essentially, of a tunnel diode shunted by a resistor which satisfies the stability conditions for operation in the amplifier mode. The advantages of the tunnel diode transducers are (1) small size (2) sensitivity and (3) versatility. Since the p-u function region is normally 1 mil in diameter or less, miniaturization is possible. Pressure sensitivity as high as 2 mv/v/psi were observed over a 60-psi range. Expressed in terms of gauge factor, the above sensitivity is equal to about 30,000. Such high sensitivities within narrow pressure ranges, were achieved at pressures up to 20,000 psi. The pressure range as well as the pressure sensitivity in a chosen pressure interval can be varied very simply by adjusting the values of the shunt resistor and the current through the diode-resistor combination. Even higher gauge factors can be obtained with other semiconductor materials.

603-55-154

06210

Simon, V.
Zyha, J.

Pharmazie VII 648-50 (55)

Potentiometric Microdetermination of Free Halogens and of Active Chlorine with Hydroquinine Solution

This article involves only chemical reactions observed from 2 weeks to 50 days.

328-62-800

06220

Smith, O.W.

Instrum and Control Systems 35, No.3 114 (62)

In-System Pressure Calibration

"Cali-system" a device for portable "in-system" pressure calibration. Consists of a pressure controller plus isolating valve plus a fluid-separator-equipped dead-weight tester.

602-49- 151

06230

Sneddon, R.

Pet. Engrg. 21 C11-12 (49)

Electronic Leak Detection

Portable detector-uses mass spectrometer- used for pressure or vacuum.

609-51- 800

06240

Sommer, H.
Thomas, H.A.
Hipple, J.A.

Phys. Rev. 32, 697 (51)

The Measurement of e/m by Cyclotron
Resonance

980-39- 900

06250

Soukaras, K.M.

U.S. Naval Lab. (39)

Study of the Problem of Detection

1. Vacuum tubes-Grids 2. Vacuum tubes, Detector 3. Vacuum tubes,
Rectifier 4. Vacuum tubes, Transmitting 5. NRL R-1517

378-50- 510

06260

Spalding, D.B.

J. Sci. Instr. 27, 310 No. 11 (50)

Simple Manometer for Use in Measuring
Low Air Velocities

Two designs of simple direct reading instrument are described for measuring steady differential air pressure down to 0.002 mm of water column; differences of liquid level are magnified by tilting of mirror supported on floats.

801-56- 800

06270

Spalding, T.R.

U.S. 2,759,175 (56)

Leak Detector for Pipe Joint

A leak detector was developed for the joints of a pipe carrying a liquid, the loss of which is undesirable either because of its value or its toxic effect on personnel. A perforated layer of electrically insulating material is secured about the joint, then an electrically conducting foil, and finally a moisture proof outer covering to prevent erroneous signals due to condensation. An electric potential is impressed between the foil layer and the pipe resulting in an open circuit that may be closed only by leakage from the pipe. Any current flow between the pipe and the foil will close a relay and sound an alarm.

980-53- 151

06280

Spencer, H.G.

Hanford Atomic Products Operation, Richland Wash. (53)

Functional Testing and Operating Manual for Consolidated Helium Leak Detector

A pile gas leak detection system consisting of a mass spectrographic type of He detector, a long sampling line for use in remote or relatively inaccessible locations, a pump to pull a continuous sample of gas from the tip of the probe to the detector, and a rotameter to measure the gas flow rate in the sampling line has been developed, calibrated, and operationally tested. The system is practical for use in locating all pile gas leaks larger than about 0.1 cubic foot per hour. The calibration data permit the calculation of the size of a leak, when located, with an accuracy ordinarily sufficient for practical use for Hanford Pile leak repairing. Approximately thirty minutes is required to check the top of a Hanford Pile for leaks. Under certain conditions, the front face of a Hanford Pile can be checked in two to three hours.

980-58- 133

06290

Spencer, N. W.
Boggess, R. L.

Michigan U. Ann Arbor

On the Use of Ionization-Gage Devices
at Very High Altitudes

The use of an ionization-gage-omegatron combination in rockets and satellites at very high altitudes is considered. Appropriate instrumentation employing these devices is believed to offer good possibilities for the measurement of atmospheric pressure, temperature, density, and composition.

764-40- 510

06300

Spence, R.

Faraday Soc. Trans, 36, 417-19 (40)

Accurate Direct-Reading Manometer for
Corrosive and Other Gases

A glass manometer is described in which the relation between scale reading and pressure is linear. The dead space is small and practically constant and pressures up to 1 atm. can be readily determined to within 0.25mm Hg. The instrument is specially suited for the study of gas reactions.

368-58- 800

06310

Stanwick, J. D.

J. Chem. Soc. 3214-5 (58)

New Double Spoon Gage

This pyrex-glass gage adapts the lever principle to the relative movement of 2 opposed spoon gages, by causing the fulcrum of the lever type pointer to move in the opposite direction to the applied force. The gage is capable of detecting pressure differences down to 10^{-2} mm Hg, and is sufficiently robust to withstand cleaning with liquid reagents.

378-50-110

06320

Steckelmacher, W.
Van Der Meer, S.

J. Sci. Inst. 27, 189 (50)

Automatic Regulation of Thermionic Emission

A circuit is described which automatically controls the emission of thermionic devices for large changes of emission characteristics and is also independent of large mains voltage fluctuations.

331-58-153
412

06330

Steele, D.I.
Kuiazuk, M.

IRE Trans on Ind. Electronics PGIE-6
64-7 (58)

Sonic Gas Analyzers and Their Industrial Uses

The modification of a previously described analyzer to use in industrial analysis is described. Sensitivities of common gases in both air and He are given. Suggestions are made for its use as a detector in gas chromatography.

980-61-600

06340

Steiger, M.H.
Bloom, M.H.

Polytechnic Inst. of Brooklyn, N.Y. (61)

Axially Symmetric Laminar Free Mixing with Large Swirl

Viscous laminar axially-symmetric free mixing with large swirl is investigated by a boundary layer type of analysis with integral method. Large swirl generates axial pressure gradients as well as large radial pressure gradients, and therefore alters the streamwise flow. Examples calculated for both incompressible and compressible flow show that the wake may be significantly lengthened by large swirl. However, this effect is shown to be diminished in the compressible case where higher freestream Mach numbers lead to decreased densities, and to decreased centrifugal effects, decreased radial pressure gradients, and decreased axial pressure gradients. In the limiting special case of small or moderate swirl the results agree with those previously obtained by Steiger and Bloom in an analysis wherein the induced pressure gradients were neglected a priori.

980-43-154

06350

Steigmann, A.

J. Soc. Chem. Ind. 62, 43-4 (43)

Specific Tests for Mercury with Dithizone
Membrane Papers

The technique for making spot tests described in this paper depends on the fact that water permeable, div. acetylcellulose membranes contg. dithizone cause a capillary sepn. of heavy metal ions in acidic or basic solns. Some metals give strong and others more or less diffuse reactions at the center of the test spot on the membrane but a third group gives reactions only in the outer margins of the spot. A special dithizone membrane paper can be prepd. which is almost impenetrable to ions and such paper reacts specifically with HgCl_2 . Directions for prepg. both the penetrable and the impenetrable membranes are given and the results obtained with 15 different cations are tabulated.

087-62-800

06360

Steinherz, H. A.

Chem Engineering 67 No. 17 117-32 (62)
High Vacuum Techurlogy and Equipment

A dicussion of vacuum theory, vacuum pumps, vacuum gages, leak detection, materials of construction, vacuum valves, and system designs and operation with 31 references.

082-53-800

06370

Stoddard, C.K.
Mooz, W.E.

Chem. Eng. Progr. 49, 197-202 (53)
The Design and Operation of High-Vacuum
Systems

Observations and experiences derived from the development of a particular metallurgical process are discussed for engineers and others working with high vacuum for the first time. Particular attention is given to static and dynamic vacuums; mech. and diffusion pumps; leak detection; gasketing; oil purifiers for mech. pumps; diffusion-pump fluids; vacuum valves; cold traps; welding for vacuum service, and cleanliness of the system.

980-58-153

06380

Stoffel, W.
Insull, W.
Ahrens, E.H.

Proc. Soc. Exptl, Biol. Med. 99, 238-41 (58)
Gas-Liquid Chromatography of Highly Unsatur-
ated Fatty Acid Methyl Esters

Proof that Me esters of highly unsatd. long-chain fatty acids are not signifi-
cantly altered in chem. structure during gas-liquid chromatography with the stationary
phase Apiezon M at 197° is presented. Relative retention vols, of C₁₆, C₁₈, C₂₀ and
C₂₂ polyenoic acids are listed for 2 stationary phases, the non-polar Apiezon M and
the polar Reoplex 400. A system for rapid total analysis of complex fatty acid mixts
on a submg. scale is described.

443-47-800

06390

Stohr, M.

Le Vide 9, 268-71 (47)
Elements of Vacuum Technology

443-47-800

06400

Stohr, M.

Le Vide 2, 205 (47)
Elements of Vacuum Technology

Review of different joints used in vacuum technique, such as greased ground
glass, cemented joints, and gasket joints.

684-57- 400

06410

Stott, F.D.

Rev. Sci. Instrum V28 No. 11 914-15 (57)

Sonic Gas Analyzer for Measurement of CO₂
in Expired Air

A sonic gas analyser intended primarily for estimation of CO₂ in the physiological range of 0-10% is described. The instrument uses a resonant cavity maintained in oscillation by a transistor amplifier as the measuring device. The change in frequency caused by the presence of CO₂ in the cavity is linearly related to the amount of CO₂ present. As described the instrument is intended for continuous sampling at a rate of about 2 litres/min. The time of response is about 0.5 sec for full deflection.

980-49- 151

06420

Storruste, A.

K. Norake Videnskab Selskabs Forh. 22
No. 6 18-20 (49)

A Simple Mass Spectrometer for Leak Hunting

A small mass spectrometer for leakage hunting is described, in which hydrogen is used instead of the more expensive helium, and in which the radius of the ion path is only 12mm. There is no separate evacuating system. Both the ion source and the collector box are in the magnetic field of 1350 gauss. In the pressure range 10⁻⁵ to 10⁻³ mm Hg. the maxima for H¹, H², H³ correspond to accelerating voltages 100, 50 and 35 v. respectively. Either a d.c. amplifier with a meter or an oscillograph are used for the measurement of the output current.

684-56-220

06430

Stranks, D.R.

J. Sci. Instrum. V33 No. 1 1-4 (56)

A Scintillation Counter for the Assay of
Radioactive Gases

A glass chamber, with a plastic scintillator serving as one wall, may be used to assay gaseous samples of weak β -emitting nuclides. The specific activities of duplicate samples can be reproduced to $\pm 0.5\%$. Since the observed counting rate of an active gas sample is independent of gross impurities and the chemical form of the nuclide, sample preparation is simpler and faster than for other gas-counting methods. The scintillation counter assembly can be readily adapted to the assay of both liquid and solid samples; the method described for liquid assays has certain advantages over existing methods.

616-57- 110

06440

Srivastava, B.N.
Saxena, S.C.

Proc. Phys. Soc. B V70 369-78 (57)

Thermal Conductivity of Binary and Ternary
Rare Gas Mixtures

The thermal conductivity of the binary gas mixtures Ne-A, Ne-Kr, and A-Kr, has been measured at 38°C for various concentrations by using the "thick-wire" variant of the "hot-wire" method. These data are likely to be of great use for gas analysis in the usual experiments on diffusion and thermal diffusion and have, therefore, been represented by semi-empirical equations giving the conductivity over the entire range of concentration. The experimental values of thermal conductivity have been compared with those calculated on the Lennard-Jones 12-6 model and the modified Buckingham exp-six model. A simple modification of the Lindsay-Bromley formula has been suggested and is found to reproduce the experimental data extremely well. The thermal conductivity of the ternary mixture Ne-A-Kr has also been measured for different compositions of the mixture.

841-52-800

06450

Strong, J. D.

Vacuum 2, 111-14 (52)

A Bakable Evaporation Apparatus and
Throughput Gage

The app. consists of a steel bell jar with 2 observation windows each with a double Pb gasket. The electrodes in the base plate are made vacuum-tight with Silastic. The jar is evacuated with a Hg pump while at 160°. The mech. pump can be cut off for a short time by a stopcock and the gases, collected by the Hg pump, can be read on a McLeod gage protected by a throughput gage trap. The throughput is defined as pressure x vol. (l)/time. Good outgassing is obtained by measuring throughput, and Ag films can be produced with particularly low absorption.

980-60-800

06460

Sturtevant, B.

Guggenheim Aeronautical Lab. Pasadena (60)

Effusion of Charged Particles from a
Shock Heated Gas

An experimental and theoretical investigation is made of the application of a molecular beam type sampling device for studying low density shock tube flows to the case of slowly ionizing argon behind a reflected shock wave. The flux of charged particles from a gas heated to about 10,000°K and 20mm Hg. through a small orifice in the diffusion of charged particles to a cold metallic wall. Providing the diffusion process is understood, the measurements constitute a direct observation of incipient ionization. The transient charge diffusion mechanism is studied in detail theoretically, avoiding the assumption of ambipolar diffusion. It is concluded that the major problem lies in the understanding of the wall-gas interaction as represented by boundary conditions at the wall. An approximate relation for charge effusion is derived.

980-59- 170

06470

Subbotin, G.K.
Zharikov, I.I.

Bezopasnost Truda V Prom 3 No 10 10 (59)

Introduction of a Gas Analyzer Type SHI-3
into (coal mine) Shafts.

The type SHI-3 optical interferometer is capable of detg. up to 6 vol % CH₄ or total CH₄ and CO₂. In the absence of CH₄ it is possible to use the instrument to detn. H concn. The principle on which the device operates has been previously described in connection with another model. In 1959 there were 6300 such devices in use at the Kuzbass Coal Combine.

980-58- 220

06480

Sullivan W.F.
Coleman, J.H.

Am. Institute of Chem. Engr. N.Y. (58)

Location of Leaks with Radioisotopes in
Multiwalled Tanks.

A technique is described for locating leaks in multiwalled tanks and has been successfully applied to the location of leaks in lead lined, wooden tanks, by dissolving radioiodine in an oil layer, it is possible to introduce the isotope into the leak channel and then remove all surplus radioactivity from the tank. Residual radioactivity is detected with a portable survey meter and the original leak site located readily by external measurement.

004-55- 800

06490

Susano, C.D.

Analytical Chem. V 27 453-4 (55)

Pyrohydrolytic Determination of Fluoride and
Other Halides

An apparatus for the pyrohydrolytic determination of fluoride and other halides is described. The reaction is slow and conducted at temp. of the order of 1000°C. It is made of platinum or nickel with stainless steel used wherever possible.

328-62-800

06500

Swift, R.

Instruments and Control Systems 35 No.5
124-5 (62)
Multi-Contaminant Tester

Harmful air contaminants can be monitored and measured by reacting the suspected gas with chemicals that cause a stain to appear. By passing a known volume of sample through a glass tube which contains the proper chemicals, the length of the stain in the tube is a measure of the concentration of the suspected toxic gas.

376-56-140

06510

800

Takeishi, Y.

J. Phys. Soc. Japan VII No. 6 676-89 (56)

Auger Ejection of Electrons from Barium Oxide by Inert Gas Ions and the Cathode Fall in the Normal Glow Discharges.

Total yields, y , and energy distribution were calculated for electrons ejected from BaO by inert gas ions, on the basis of the theory of Auger neutralization. The method used was similar to Hagstrum's method for tungsten. Total electron yields, y , were found to be 0.481, 0.480, 0.476, 0.474 and 0.471 of He, Ne, Ar, Kr, and Xe ions of several electron volts respectively. In the case of Ar, the calculated value of y is in good agreement with Varney's measurements, and the high energy of ejected electrons is just what Varney expected. The cathodic phenomena in the normal glow discharges were observed for He, Ne, Ar, and Xe gases with BaO-coated cathode and tungsten, and were interpreted by vonEngel and Steenbeck's theory using the calculated values of y for BaO and the observed one by Hagstrum for tungsten.

801- -111

06520

Talmey, P.

U.S. 2,306,509

Apparatus for Detecting and Warming of Gas
in Air

Use is made of an elongated enclosure for confining air to be tested, a metal fitting at each end of this enclosure for holding a wire-like detector element along the interior of the enclosure, on of these fittings being movably mounted, a detector element comprising a plurality of low-creep wires substantially continuously covered with catalyst material stretched between said fittings, means for passing a preheating elec. current through the wires, and resilient means for urging the movable fitting outwardly to operate an external device in response to the elongation of the wires in the presence of a gas to be detected in contact with the catalyst. A catalyst such as Pt or Pd on nichrome wire may be used.

801- -154

06530

Tandberg, J.G.
Damsberg, C.E.A.

U.S. 2,228,737

Testing Apparatus for Leaks

A method of testing refrigerating app. or other app. for leaks with an indicator which changes color responsive to change in H-ion concn. and a testing fluid which passing through a leak causes the change in H-ion concn. involves supplying on the surface of the app. where the indicator is applied an alk. dichromate to prevent a false indication by change in pH due to oxidation or galvanic action at the surface upon application of the indicator.

961-59- 153

06540

Tarasov, A.I.
Kudryavtseva, N.A.
Ioganson, A.V.
Lulova, N.I.

Zavodskaya Lab. 23, 803-5 (59)

Automatic Analysis of Gases in a Stream by
Means of the Kn.P.A.-I Chromatograph

An automatic chromatograph-gas analyser contg. tripoli, paraffin-naphthene oil, and Na_2CO_2 is described, which can be used to control the compn. of gas currents in petroleum refining processes. The hydrocarbons $\text{C}_1\text{-C}_5$ and their isomers can be sepd. with this app.

684-44- 151

06550

Taylor, J.E.

Rev. Sci. Instrum. 15, 1-8 (44)

Mass Spectrometer and Gaseous-Thermal-
Diffusion Isotope Separator

The mass spectrometer is like that of Nier but with the following changes permanent Alnico magnet; auxiliary magnetic field parallel to the electron beam in the ion source; gas for analysis admitted through variable capillary valve; vacuum measured with ionization gage; oil-diffusion instead of Hg pump. The six-unit separator, 7 feet high, is convectively coupled and is similar to that of Watson. It yields concns. of C^{13} up to 20%. The concn. was observed as a function of time and the equil. then compared with theory for several pressures.

374-56- 144

06560

Taylor, J.H.
Yates, H.W.

J. Opt. Soc. Amer. V46 No.11 998 (56)

Infrared Evidence for Atmosphere Ozone at
Sea Level

Using a multiple C-arc as light source, NaCl prism monochromator and thermocouple receiver, O_3 has been detected in a 10 mile path over seawater at an atmospheric concentration of 2.6 parts per 100 million, or equivalent pathlength of 0.42mm.

980-61- 800

06570

Tebo, A.R.

Army Signal Res. and Dev. Lab. Fort
Monmouth, N.J. (61)

Precise Measurement of Atmospheric Temperature Differences

Design of a circuit is given for the continuous measurement of temperature differences up to 10 C over the temperature range -40 to 40 C. Bead Thermistors are used as sensors in an off-balance Wheatstone bridge. The output is linearized by means of another thermistor in the input circuit. Compensation for change in temperature level is accomplished by means of a variable resistance in the input circuit, controlled by a bi-metal at the basic ambient temperature. Using a 6V dc source, the full-scale output for a temperature difference of 10 C is ten millivolts, which may be fed into a null-balance-type recorder. No switching is necessary over the whole range except when the temperature-difference reverses polarity, in which case switching can be accomplished in the recorder circuit. Accuracy of the linearized and compensated circuit is better than 0.1 C.

980-61- 151

06580-

Testerman, M.K.

Arkansas U. Fayetteville, (58)

The Development of an RF Mass Spectrometer
for the Study of Combustion Processes.

A unique sampling system has been designed for the RF mass spectrometer to adapt the instrument for studies on the reaction mechanism of combustion. The RF mass spectrometer tube through a sampling nozzle which allows the gaseous products to enter at atmospheric pressure and finally introduces them into the RF mass spectrometer tube at pressures of 10^{-4} to 10^{-5} mm. This is accomplished with a probe that contains a series of aligned orifices which are differentially pumped and which form a molecular beam from the sample being introduced. The molecular beam is supposed to be modulated at a 30 cps rate within the sampling probe so that the mass spectrometer can discriminate against the incoming molecular beam and the background gases with the tube. Several modulating devices were investigated, and a mechanical system was chosen. During the testing phase to determine the performance of the sampling probe and the beam chopping system it was found that a suitable synchronizing signal was not obtained due to unexpected backlash in the mechanical system. The instrument described is also capable of performing batch analysis of gases. Other features of the instrument such as special circuits, vacuum system requirements, and design criteria are described in this report. The principles of operation of the RF mass spectrometer tube and associated electronic circuits are presented, along with the results of analytical tests made with the instrument. Investigations of rhenium emitters as the source of ionizing electrons in a mass spectrometer have also been made and the results of these tests are presented.

801- - 800

06590

Thayer, C.H.
Prickett, T.B.

U.S. 2,200,310

Valve and Leakage-Indicating Apparatus for
Use with Fluids such as Oil Vapors and Air in
Adjacent Chambers

Various structural and operative details.

980-59- 110-151

06600

131-510

.133

Atomkernenergie 4 No. 2 75-80 (59)

Thiel, A.

Leaktightness and Tightness Testing in
Nuclear Engineering

Vacuum system technology as used in nuclear engineering is examined. Requirements for various vacuum systems are reviewed, and sub-pressure testing methods such as the discharge tube, heat-conduction manometer, ionization manometer, halogen leak finding manometer, and mass spectrometer are described. Also, various excess pressure testing methods are described and an estimate of the sensitivity of each is given. A program for general testing is outlined, and tolerable leaks are discussed.

366-43-154

06605

Thiessen, G.W.
Beck, F.M.
Smith, A.E.

J. Chem. Education 20,530 (43)

Detection of Halides

The escaping halogen can be identified by color, odor and action on moist litmus. This test is recommended for beginners.

083-45- 151

06610

Thode, H.G.
Graham, R.L.
Ziegler, J.A.

Can. J. Res. 23B 40-7 (45)

A Mass Spectrometer and the Measurement of
Isotope Exchange Factors

A 180° mass spectrometer for the measurement of isotope abundance is described. The instrument has a resolution of one mass unit in 100, which is the resolution expected from the dimensions of the slits and the radius of curvature of the ion path. The precision of the instrument is sufficient to make possible the direct measurement of equil. consts. for many isotopic reactions.

980-44- 151

06620

Thomas, H.A.

Bull, Agr. Mech. Coll Texas Eng. Expt.
Sta. Bull. No. 101 (44)

Development of a Cold Cathode Ion Source
for a Mass Spectrometer Type Vacuum Leak
Detector

Various design features, together with a discussion of performance.

684-46 -151

06630

Thomas, H.A.
Williams, T.W.
Hipple, J.A.

Rev. Sci. Instrum. 17, 368-72 (46)

A Mass Spectrometer Type of Leak Detector

The instrument described measures one part of He in 400,000 parts of other gases. The instrument is built around a 180°-type mass spectrometer tube which is pre-focused for He ions. Use is made of this high sensitivity tube to locate leaks in vacuum equipment which can be connected and evacuated by the pumps in the unit. A fine stream of He played over the surface will enter the leak and register immediately on the output meter. Very small leaks can be located easily to within 1/4 in.

980-47- 151

06640

Thomas, H.A.
Sommer, H.
Wall, R.

Proc. Natl. Electronics Conf. 3, 371-6(47)

A Mass Spectrometer Type Leak Detector
Utilizing a Cold Cathode Ion Source

A unit capable of detecting 5 p.p.m. of He in air is described. Use of a glow-discharge ion source with a combined electric-magnetic analyzer permits simplified construction and foolproof operation.

884-46- 151

06650

Thomas, H. A.
Williams, T.W.
Hipple, J.A.

Westinghouse Engr. 6, 108-11 (46)

Detecting Vacuum Leaks Electronically

The vacuum system is explored with a tiny jet of helium. A sample of gas in the leaky vacuum system is withdrawn and passed through a mass-spectrometer tube designed specifically for the detection of He. The tube measures the He present in spite of the presence of other gases. It can detect as little as 1 part He in 400000 parts air at an operating pressure. of 0.3 micron Hg. The tube and its functioning are described in detail.

765-50- 110 - 144
113 - 148

06660

Toeller, H.

Trans. Instrum. Meas. Conf. Stockholm
107-13 (50)

New German Technical Heat-Measuring
Instruments and Controllers

Various commercial types are briefly discussed. These include thermocouple photoelectric potentiometers, a rapid response radiation pyrometer, infrared gas analysis apparatus, a thermal conductivity gas tester, pneumatic and potentiometric temperature regulators and a gas-mixture controller.

998-57-132

06665

Torney, F.L.

1957 Fourth National Symposium on Vacuum
Technology Transactions 115-9 (57)

A New Type of Vacuum Leak Detector

A new type of halogen leak detector, having a sensitivity which approaches that of a helium mass spectrometer, is described. This paper outlines in detail the reasons for selecting this new approach and the details of circuit design which accomplish this end. Operations characteristic of a halogen sensing element are discussed and their influence on circuit design is analyzed. A brief discussion of the advantages and disadvantages of this method is given, with particular emphasis on the electronic circuit design parameters which make these advantages possible.

241-43- 800

06670

Townsend, R.N.
Haun, R.E.

Gas Age 92, 49-51, 102 (43)

Leakage Survey Practices Using Pneumatic
Drills and Leakage Indicators

Report on Experiences with Leak Indicators.

801- - 180

06680

Tuel, W.G.

U.S. 2,200,523

Detecting Halide Gases as in Case of Leakage
of Refrigerant Gases

The gas under test is introduced into a unignited stream of fuel gas, and a burner is provided for burning the gas with a substantially colorless flame, a portion being formed of material such as Cu which when hot reacts with the halide if present to impart a color to the emergent flame.

961-55-163

06690

Tuluevskii, Y. L.

Zavodskaya Lab. V 21 74-80 (55)

A New Method of Determination of Flow
Turbulence

The turbulence intensity is determined from measured amts. of trajectories by the shadow method. The apparatus consists of a Pt. source of light, which is made to cross the stream and fall upon a screen. An optical excitation in the stream produces a visible shadow on the screen. This is good for heat transfer problems in furnaces.

980-50-133

06700

510

Turnbull, A.H.

Atomic Energy Res. Estab. (50)

Experiments with a Differential Pirani
Gauge Leak Detector

The principle of the differential leak detector is explained. With a differential Pirani gauge detector located on the backing side of a diffusion pump, where the average pressure was 15 μ Hg, the "noise level" of pressure fluctuation registered by the galvanometer in the detector control circuit was seven times less than that registered by a single Pirani gauge. The minimum air pressure change which could be detected by the differential arrangement was 10^{-5} mm Hg. with the optimum leak hunting conditions 10^3 μ sec. 10^{-5} mm Hg. 10^3 μ sec.

524-58- 153

06710

Turner, D.W.

Nature 181, 1265-6 (58)

A Robust But Sensitive Detector for Gas-Liquid Chromatography

An instrument is described for use in gas chromatography for the detection of changes in dielec. consts. It is robust but of simple construction, uses a small vol. of gas, and is linear over a long range. The sensitivity of the instrument varies with the dielec. const. of the vapors; thus, threshold concns. were found to be 2 μ of Me_2CO and 8 μ Et_2O per cc. in a N stream. Most org. compds. which contain a functional group have threshold concns. which lie between these values. The instrument is insensitive to flow-rate changes up to 500 cc/min and to pressure changes up to 10cm Hg for a N stream. Long term drift, after a 30 min. warm-up is absent at that sensitivity which gives a full scale deflection for 1 mg. Me_3CO per cc.

883-57- 170

06720

Turner, R.P.

Welding J. 36, 1167-71 (57)

Black Light to Detect Leaks

This method is used as an in-process check for leaks and is not used as a final check. A person sprays this fluorescent material wherever a leak is suspected and checks it with a blacklight. If a leak is present, there will be a glowing spot when examined. This, like the halide detectors, would be time consuming for large areas.

980-61- 800

06730

Tyler, E.

Aircraft Atmaments, Inc. Cockeysville, Md. (61)

Point Source Gas Alarm.

Further research and development tests and engineering developments have taken place in the following portions of the alarm; (1) experimental and original design air pump tests; (2) several areas of electronics have been modified and tested, including the tape transport drive system, radio interference studies, and engineering studies of the low-voltage cutoff, the regulated voltage, and the alarm light oscillator circuits; (3) new materials and designs of the fluid pump were tested; (4) improvements to the alarm case to enhance water-tightness and ruggedness (5) investigation into alarm transportability; (6) impact tests and correction of tape drive retraction snubber; (7) development of modified vacuum sensor switch; and (8) analysis of photometer head problems.

684-62- 510

06740

Tyler, B.J.

J. Sci. Instrum. 39 No.3 111 (62)
Recording Bourdon Gauge Manometer

A simple modification of a Bourdon spoon gauge is described which permits automatic photoelectric recording of pressure changes. A pressure range of from 0 to 760 mm Hg was available with a detectable response to changes as low as 0.01 mm Hg.

980-47- 111

06750

Ubisch, H. von

Ark Mat Astr. Fys 34A (47)

An Investigation on Hot-Wire Vacuum Gauges

Filaments of Mo. Ni. W. and Pt. of various cross-section and lengths maintained at various temperatures in air, H_2 and CO_2 were investigated. Some filaments were in narrow glass capillaries or in spiral form. Identical filaments formed opposite arms of a Wheatstone bridge of which the other two arms were precision resistors. With a manually operated balanced bridge, pressure changes of 10-5 mm Hg could be detected at low pressures, the useful range being extended to about 30 mm Hg pressure for thin filaments. With a direct-reading bridge with constant current supply, the sensitivity and calibration curve are influenced markedly by the galvanometer current. A theory of the distribution of temperature on a filament is developed.

524-48- 111

06760

Ubisch, H von

Nature, Lond. 161, 927-8 (48)

A New Hot-Wire Vacuum Gauge

The wire is heated by current from a 800c/s regenerative amplifier circuit, and the oscillation amplitude adjusts itself to keep the wire temperature constant. An extended spiral of 0.01 mm W wire is used, and readings may be made from 0.01-100 mm Hg.

980-48- 111

06770

Ubisch, H. von

Ark Nat Astr. Fys 36A (48)

An Investigation on Hot-Wire Gauges III

The behavior of the manually operated balanced bridge circuit is briefly discussed. By replacing the galvanometer by an amplifier, for which a detailed circuit diagram is given, automatic regulation of current is provided and the inconvenience of manual operation and the danger of overloading avoided. Attention is directed to the upper pressure limit of hot-wire gauges, and the calibration curves of a pyrex gauge with spiralled tungsten filaments for air, A, H_2 , and CO_2 are given. The range in air is from about 10^{-3} to 50 mm Hg.

008-51-110

620

Ubisch, H.von

06780

Appl. Sci. Res. A2 No.5, 6 364-402 (51)

On the Conduction of Heat in Rarefied Gases
and Its Manometric Application I

Formulae for the conduction of heat in pure gases and in binary mixtures relevant to a tube with a thin axial heated wire are developed. They cover the region of pressure between that for which the heat conduction is independent of pressure and that for which Knudsen's formula is valid. A theory for precision manometry is given and the monometric constants for twenty-five gases have been measured.

008-51-110

620

Ubisch, H.von

06790

Appl. Sci. Res. A2 No.5, 6 403-30 (51)
On The Conduction of Heat in Rarefied Gases
and Its Manometric Application II

The geometrical design of tubes for manometers, the design of circuits and the properties of direct-reading, hot-wire manometers are investigated. Examples of improved manometers are given. Further possible improvements and leak-hunting are discussed.

247-46-133

06800

Valkenburg, H.E.von

Gen Elect. Rev. 49, 38-42 (46)

Application of the Ion Gage in High Vacuum
Measurement

Describes an ionization device suitable for continuous indication of pressures down to 10^{-8} mm. A relay is included which interrupts the filament current should the vacuum suddenly be lost. For lower pressures, discrepancies occurred between different instruments. The calibration and operation of the apparatus is easily made a matter of routine.

684-56- 133

06810

Van Leeuwen, J.A.
Oskam, H.J.

Rev. Sci. Instrum. 27, 328 (56)

Simple and Sensitive Leak Detector

This is a Philips ionization gauge with silica gel trap and uses the method of pressure change for detection. The silica gel in the trap is outgassed at 300°C and then cooled to temperature of liquid air. It then absorbs most of the air and other gases but not hydrogen or other mobile gases. Thus, hydrogen is used as a probe gas; and, if there is a leak in the vacuum system, hydrogen will be introduced into the system and the resulting change in pressure will be indicated by the ionization gauge. The Philips gauge is specifically used because it pumps away gas and has a higher sensitivity than a Pirani gauge.

801-59- 133

06820

VanLuik, F.W.

U.S. 2,897,059 (59)

Detection Device for Carbon Monoxide and Carbon Dioxide in Gaseous Mixtures

The monitoring device relies on the conversion of gaseous C compds. into condensation nuclei by passing the gas through a corona discharge, one of the corona forming elements is constituted of materials capable of forming metallic carbonyls with the gaseous C compds. The carbonyls upon soln. produce measurable quantities of condensation nuclei and these are recorded by standard techniques.

684-56- 140

06830

Varadi, P.F.
Sebestyen, L.G.

J. Sci. Instrum. 33, 392-4 (56)
A Simple Vacuum Leak Detector Using a
Radiofrequency Mass Spectrometer

A simple vacuum leak detector, based on the radio-frequency mass spectrometer principle is described. In the pressure range of 10^{-3} - 10^{-7} torr, leaks of the order of 2.8×10^{-3} l. torr/s can be detected. The instrument may also be used as a conventional ionization manometer. A brief description of the principles and some details of the construction of the tube and of the portable electronic equipment are given.

844-58-151

06840

Varadi, P.F.
Sebestyen, L.G.
Rieger, E.

Vakuum - Tech 7, 13-16 (58)

H.F. Mass Spectrometer and its Utilization
in Vacuum Techniques

A portable high-frequency mass spectrometer is described. A simple spectrometer with low resolution power was designed for the investigation of leaks. It operates in the range from 10^{-3} to 10^{-7} torr and can detect leaks up to 2.8×10^{-3} Torr/sec. The installation can be used also as an ionization manometer for the measurement of the total pressure.

684-56- 140

06850

Varicak, M.

Rev. Sci. Instrum 27, 665 (56)

Penning Gauge as Leak Detector

The gauge, working the region 5×10^{-3} to 5×10^{-6} mm Hg was able to detect pressure changes of 10^{-8} mm Hg. The detection was done by balancing a galvanometer by the potentiometer method. This system requires 900 volts and a magnetic field of 400 g.

165-56-112

06860

Varicak, M.

C.R.Acad Sci. V243 No. 13 893-5 (56)
Study of the Use of Thermistors for the
Measurement of Low Pressures

The increase in sensitivity of a low-pressure gauge using a thermistor bead (resistivity 120,000 ohm cm at 20° C and resistance temperature coefficient -0.0412 per $^{\circ}$ C) produced by lowering the wall temperature and by increasing the heat dissipating surface of the thermistor, was tested. Pressures down to 10^{-6} mm of Hg could then be measured.

527-57-112

06870

Varicak, M.

Nuovo Cimento V6 No.3 723-8 (57)

Experiments in the Use of Thermistors for
Low Pressure Measurements

It is shown that bead thermistors can be used only in the pressure range from 1×10^{-3} mm Hg. On the other hand thermistor systems consisting of bead thermistors fixed to thin metallic foils take advantage not only of the high temperature coefficient of thermistors, but also of the low radiation emissivity and heat capacity of metals. These devices allow precise measurements down to 10^{-6} mm Hg.

378-55-140

06880

Varicak, M.

J. Sci. Instrum. 32, 346 (55)

Vosicki, B.

Study of the Penning-Gauge Characteristics

980-56- 800

06890

Varnerin, L.J.

Westinghouse Electric Corp. E. Pitts, Pa.

Carmichael, J.H.

(56) Apr-Jun-Jul -Sept

Electrical Cleanup of Gases

374-55-151

06900

800

Vallee, B.L.

J. Opt. Soc. Amer. 45 No. 1 63 (55)

Adelstein, S.J.

Effects of Inert Gases on D.C. arc Discharge

Discusses a recent publication by Stone on the enhancement effects etc., of the rare gases in spectroscopic analysis.

100-56-132

C 6905

Vivian, A.C.

Civil Engineering V51 1229-30 (56)

Halogen Leak Detector for Underground Mains

A method of using a Halogen detector for finding leaks in underground mains is discussed. A halogen gas such as CCl_4 or Cl_2 is put into the pipe by means of the air line. The sensitivity is such that the apparatus will detect and give an audible signal if there is as little as 1 pt. per million halogen gas mixed with air. The instrumentation comprises, within the search nozzle, concentric Pt. cylinders heated to about 800° arranged so that a small fan draws a sample of air between the heated Pt. cathode and anode. The current for the fan and to heat the electrodes is supplied by a transformer in a box which also contains the audible warning device. The transformer is supplied with 250V single phase A.C. from a portable generator.

965-51 - 143

06910

170

Volcker, E.

Z Naturforsch 6a 512-13 (51)

A Simple Indication of Leaks in High Vacuum Apparatus

The apparatus is painted with a thin film of diluted fluorescent solution of fluorescein or eosin, which seeps into the cracks and leaks when the apparatus is evacuated. If then the cleaned apparatus is illuminated with uv. light the leaks are indicated by the fluorescent places.

378-53- 133

06920

510

Von Dardel, G.

J. Sci. Instrum. 30, 114-7 (53)

Combined Pirani and Ionization Circuit

The Pirani gage is of the const.-temp. type with a working range from 10^{-3} to 10 mm Hg. but as a leak detector it can be used above atm. pressure. The combination and its operation are described in detail, with diagrams of both gage circuits and of the power-supply circuit.

133
721-53- 131
510
Vonnegut, B.

06930

Science 117, 108-9 (53)

Effect of Halogens on the Production of Condensation Nuclei by a Heated Platinum Wire

The presence of small traces of halogens in the atmosphere causes a very large increase in the rate at which condensation nuclei are produced from a filament at 500°C. It is suggested that the reaction compounds produced at the surface have a much higher vapor pressure than platinum at this temperature. The possibility of developing the method for trace analysis is suggested.

965-51- 143
154
Volcker, E.

06940

Z Naturforsch 6a 512-3 (51)

A Simple Indication of Leaks in High-Vacuum Apparatus

When a weakly alk. soln. of fluorescein or eosin in EtOH or MeOH is spread evenly over a degreased glass surface with a suspected leak, left on for 2-3 min., and removed, fluorescence analysis will show any dye remaining in scratches or cracks. The 2 can be distinguished with high-frequency app.

380-39- 900

06950

Vudynskij, M.

J. Techn. Phys. U.S.S.R. 914, 271-4 (39)

Secondary Electron Emission from Thin Dielectric Layers

The secondary electron emission from thin deposited layers of NaCl and KCl was measured in dependence on film thickness and temperature. The energy of the primary electrons was 600 eV, and a maximum secondary emission was found for thickness 10^{-6} cm.

980-59-153

06960

Vyakhirey, D.A.
Demina, N.D.
Avdeeva, M.P.

Trudy Khim i Khim Tekhnol 2, 133-40 (59)

Chromatographic Analysis of the Butylene
Fraction of the Gas from Cracked Kerosine

A chromatographic method is described for the complete analysis of the tech. butylene fraction of the gas from cracked kerosine. Up to 11 hydrocarbons can be deted. within 3 hrs. in 1 sample of the fraction with an abs. error not exceeding 0.5% for each component. A universal chromatographic gas-analyzer is proposed. This app. can be used not only in the rapid and reliable analysis of the butylene fraction, but also on the detn. of other tech. hydrocarbon gas mixts. esp. those contg. H, CH₄, CO₂ and air. Indications are given for reducing the time of analysis and simplifying the app. for individual cases.

980-57- 153

06970

Vyakhirev, D.A.
Bruk, A.I.

Zhur i Khim 31, 1713-19 (57)

Effects of Experimental Conditions on Chromatographic Separation in the Gas of Vapor Phases

The sepn. of CH₄-C₂H₆-C₂H₃ mixt. and C₂H₆-C₂H₃ mixt. by elution from an SiO₂ adsorption in a column was investigated at -10-(+25°). The hydrocarbon concn. in the eluting air stream was detd. by measurements of heat cond. The max. elution yields and the min. retention units, shifted unequally with the temp. towards higher values with lower temps. The heats of adsorption of the gases were calcd. from the relation between the retention vol. of the gases and the elution temp.

885-57- 153

06980

Waksmundzki, A.

Wiadomosci Chem. 11, 617-33 (57)

Chromatographic Analysis of Vapors and Gases

Elements of theory and exptl. methods are reviewed.

966-43- 900

06990

Walcher, W.

Z Physik 121, 719-28 (43)

Influence of Space Charge on the Image-
Forming Properties of Magnetic Sector Fields

The theory of Herzog is extended by inclusion of the effects of space charge. On this basis the construction of a mass spectrograph for isotope sepⁿ, is discussed.

684-57- 110

07000

112

Walker, R.E.

Rev. Sci. Instrum V28 No. 10 789-92 (57)

Westenberg, A.A.

Precision Thermal-Conductivity Gas Analyzer
Using Thermistors

The characteristics of a thermal conductivity gas-analyzer unit employing thermistors as sensing elements are analyzed theoretically. It is shown that, as a consequence of the fact that thermistors have a negative temperature coefficient of resistance, the sensitivity of the instrument as a function of bridge current exhibits a maximum. The dependence of zero stability on current and cell temperature is approx. related to differences in resistance, temperature coefficient of resistance, and geometry of the reference and sample thermistors. An apparatus suitable for precise trace analysis is described and results obtained with it are presented. It is suggested that the widespread lack of faith in the inherent stability of thermistors for analysis applications is not justified, and has probably been due to insufficient care with current and temperature control.

980-58- 800

07010

Walisch, W.

Anal. Chim. Acta 18, 632-7 (58)

Ashworth, M.R.F.

Polarovoltic Method for Halide Ion
Determination in Dilute Solution

Solns. as dil. as 0.003-0.004 N may be analyzed with an accuracy of $\pm 0.2\%$.

364-46- 155

07020

Walter, J.E.
Hershberger, W.D.

J. Appl. Phys. 17, 814-22 (46)

Absorption of Microwaves by Gases

The absorption coefficients and permittivities of 16 gases have been measured at the two wavelengths $\lambda = 1.24\text{cm}$ and $\lambda = 3.18\text{ cm}$. The gases are H_2S , COS , etc., 6 halogenated methanes and 3 amines. Improvements in techniques are described, which permit detection of absorption coefficients as small as $0.2 \times 10^{-4}\text{ cm}^{-1}$ and measurement of larger coefficients with an accuracy of 5%. The measured permittivities at these wavelengths are essentially equal to the static values. A quantitative interpretation of the absorption coefficients in terms of the known structure and spectra of the individual molecules is given. The theory indicates that all non-planar molecules which possess a permanent dipole moment should show appreciable absorption in the microwave region.

008-51- 133

07030

151

Warmoltz, N.

Appl. Sci. Res. B2 No. 1 61-5 (51)

On the Application of a Philips Ionization Gauge Type of Ion Source in a Mass Spectrometer Leak Detector

A leak detector using a P.I. G. source and perpendicular homogeneous electrostatic and magnetic fields would combine the advantages of high intensity, good resolution and freedom from filament replacement.

604-60- 900

07040

Warmoltz, N.
Bouwmeester, E.

Philips Tech. Rev. V21 No. 6 173-7 (59-60)

Metal Vacuum Equipment

Development of arc welding in argon atmosphere enabled development of components for vacuum apparatus such as cold trap, vacuum valve, and vacuum chamber for mass spectrometer; joints by which these components are coupled including use of Teflon and electrolytic copper packing are discussed; all-metal vacuum system which can be completely degassed is described.

007-57-151

07050

Warnecke, R.J.

Ann Radioelect. V12 258-81 (57)

The Omegatron and Its Applications

An account of the theory of the Omegatron is given and a simple construction described. The use of the device as a leak-detector, both by the normal and accumulation techniques, is described. The use of argon as a probe gas was studied. Resolving power was improved by using fields up to 5000 Oe. A description of an all-metal version of the tube is included.

323-45- 151

07060

Washburn, H.W.

Ind. Eng. Chem. Anal. Ed. 17, 74-81 (45)

Wiley, R.F.

Mass Spectrometry

Rock, S.M.

Berry, C.E.

Improvements of the mass spectrometer are described that permit its application to the analysis of gas and liquid mixts. such as are encountered in the petroleum industry. The relative abundance of ions of different masses, resulting from electronic bombardment of the samples, depends on the relative probability of the different ionization processes, here illustrated by the various masses resulting from the breakdown of the 3 C₈ paraffins. The spectrum of these is the linear superposition of the spectra of the components, the heights of the peaks on the spectrometer record giving the data needed in solving for the relative amts. of the constituents of the mixt. Higher accuracy is attained than with other methods for the detn. of small amts. of impurities in ethylbenzene, pentenes in isoprene, etc.; particularly if the impurity is of higher mass than the other components of the mixt. Another advantage of the method is the economy of time required for an analysis.

980-58- 130
148

07070

Watanabe, K.
Sakai, H.
Griswold, K.

Hawaii, Inst. of Geophysics, Honolulu(58)

Photoionization Counter for the Vacuum
Ultraviolet

An exploratory study was made to determine the feasibility of applying gas-multiplication techniques to high resolution ultraviolet photometry. Two types of detectors were investigated; (1) gas - multiplication ion chamber operating in the proportional region and (2) photoionization counter operating in the Geiger region. All gases studied were amenable to both methods. The first studied had a gain in sensitivity of 10^4 over that of an ion chamber, and its response was found to be linear with intensity. The ionization continua of several molecules were studied with this detector. The second type of detector was capable of detecting about 10 photons per second when nitric oxide was used as the ionizing gas. The ionization potentials determined by this technique were 9.245 eV for nitric oxide, 10.075 eV for CS₂ and 9.067 eV for 1,3 - butadiene. Fine structures due to vibrational levels were observed in the ionization continua.

684-46- 800

07080

Webber, R.T.
Lane, C.T.

Rev. Sci. Instrum. 17, 308 (46)

An Easily Constructed All-Metal Gauge.

980-53-132

07085

Weber, A.

Glas-u. Hochvakuum-Tech. Z, 259-62 (53)

Leak Detector Involving the Halogen Method
for High Vacuum Tubes

The ionic emission of a hot platinum anode increases when a halogen-containing gas impinges on it. Use has been made of this "halogen effect" in a sensitive leak detector for high vacuum systems. The instrument is described, and a circuit diagram is included.

323-48- 900

07090

Weingartner, H.C.

Industr. Engng. Chem 40, 780-3 (48)

Design of High Vacuum Engineered Plants

The design, installation, and maintenance of any industrial high vacuum system depend upon establishing and preserving a functional and economic balance among the following factors: working pressure rate of evacuation, rate of leak, and rate of gas or vapor evolution. The interrelation of these general factors, as applied to several vacuum systems, is discussed in terms of practical experience.

801-56- 220

07100

Weinstein, A.I.

U.S. 2,736,812 (56)

Bonner, F.T.

Radioactivity Measuring Apparatus

Improvements were made in radiation-measuring devices for measuring the low level B emissions from gases under low pressure. A radiation sensitive cell e.g. a Geiger-Mueller tube is separated by a thin mica window from a rotatable chamber connected in series in a gas conduit. To allow for the free passage of gas through the chamber a tube connects with the gas line inlet and outlet. To introduce the subject gas into the chamber, the assembly is rotated 90° allowing the gas to enter and exit from ports in the chamber, the gas then being measured by the counter. This arrangement allows the isolation of gas from the window under extreme pressures; the testing of gas while in transit over lower pressures and accomplishes this without removing the gas from the system.

967-43- 140

07110

800

Weise, E.

Z. techn. Phys. 24, 4, 66-9 (43)

A Measuring Instrument for High and Low Gas Pressures Using Semi-Conducting Resistors

980-58-151

07120

Weissler, G.L.
Samson, J.A.R.

U. of Southern Cal. Los Angeles (58)
Photoionization Analysis by Mass Spectroscopy

A vacuum ultraviolet monochromator has been combined with a mass spectrometer similar to previously reported instrumentation to study photoionization processes between 1570Å and 430Å.

684-57-151

07130

Wells, G.F.
Melton, C.E.

Rev. Sci. Instrum 28, 1065-9 (57)
Mass Spectrometer for the Study for Ion-
molecule Collision Processes

A controlled pressure mass spectrometer for the study of ion-molecule collision processes is described. A pressure ratio of 200 to 1 can be maintained between the ion chamber and the analyzer tube by means of differential pumping. Ion beams of the sample gas undergo collision reactions with molecules of the same or other gases in the analyzer tube. Various modifications to the spectrometer are discussed such as reducing the size of the electron collimating hole, the ion collimating slits were reduced to attain a differential pressure between the tube and the source region. These changes also caused reductions in the back diffusion into the ionization chamber of the products of pyrolysis at the filament and the overall resolution of the instrument was reduced. The source and analyzer tube pressures were measured with RG75 ion gauge tubes, have the proper electrode geometry and are capable of indicating pressure linearly over a wide range.

116
764-51-620
900
Whalley, E.

07140

Trans. Faraday Soc. 47, 129-37 (51)
Application of Thermal Diffusion to Gas
Analysis

It should be possible to analyse three component gas mixtures by partly separating with a thermal diffusion column and measuring the properties of the mixtures obtained. The minimum sizes and the minimum equilibrium are discussed theoretically and it is shown that these have quite practicable values.

165-48-800

07150

White, W.C.
Hickey, J.J.

Electronics, 21, 10 -2 (48)

Electronics Simulates Sense of Smell

Pt. heated to incandescence freely emits positive ions in air and does not readily oxidize. Emission is increased when halogen vapor compounds such as Freon and CCl_4 are present. Use is made of this principle to detect leaks.

326-50-900

07160

White, W.C.

Inst. Radio Eng. Proc. 38, 724-30, 852-8(50)

Positive Ion Emission, A Neglected Phenomena

Distinction between ordinary electron emission, system which common tubes depend, and positive ion emission which can be used in electrode devices operating in air, detects as leak detector utilizing phenomena of positive ion emission; further possibilities of positive ion devices.

443-49-132

07165

White, W.C.

LeVide 4 No. 20 584 (49)

Leak Detector Based on a New Principle

Description of the General Electric leak detector with Freon gas.

161-54-147

07166

White, W.C.

Elec. Engrg. 73, 806-8 (54)

New Electric Device to Detect Leaks of
Inflammable Gases

This consists of an electric device to detect leaks of inflammable gases. A ceramic material consisting of alumina containing a salt of an alkali metal has an electric conductivity. This type becomes an ionic solid conductor above 300°C . A variation in electric conductivity occurs along its surface when operated properly and when in the presence of an inflammable gas. The rod is heated by a Pt wire wound around it. The Pt wire is one electrode and the rod itself is the other. The resistivity of the Pt wire-ceramic junction is highly sensitive to small amounts of inflammable gas in the air.

241-49- 620

07170

Wilby, F.V.

Gas Age 104 No. 1 32-4, 64 (49)

Acetylene as a Natural Gas Leakage Tracer

The detection of leaks from natural gas pipe lines where several such lines are in close proximity can be accomplished by the use of a tracer gas. The tracer must have a crit. temp., b.p., and mol. wt. as low or lower than that of C_2H_4 . C_2H_2 was found to meet these requirements and to be satisfactory in other respects. App. and a method for metering C_2H_2 into gas streams by a rotameter are described along with a simple detection app. based on the pptn. of Ag acetylide.

378-46- 620

07180

Willey, E.J.B.

J. Sci. Instrum 23, 264-9 (46)

The Electrical Measurement of Pressures and
Indicator Diagrams

A brief discussion is given of the various methods. Apparatus of a simple kind is described, with working details, (a) for two pressure capacitors (b) for a capacitance-coupled amplifier usable down to 5 c/s (c) for a direct-coupled cathode-follower circuit and (d) for special non-linear time bases to convert pressure time curves into indicator diagrams.

980-61- 620

07190

Williams, M.M.

Naval Ord. Test Sta. China Lake, Cal. (61)

High Temperature Heat Capacity Equations and
Thermodynamic Properties of Combustion Gases

The standard state heat of oramation, reference enthalpy, reference entropy, and heat capacity equations for 200 chemical compounds are presented. These compounds are those experimentally shown to exist and those theorized as existing in high temperature combustion processes. Thermodynamic data are given for compounds consisting of the following chemical elements; hydrogen, oxygen, nitrogen, carbon, lithium, sodium potassium, rubidium, cesium, magnesium, aluminum, fluorine, chlorine, bromine, beryllium, boron, silicon and calcium.

378-46- 510

07200

Williams, S.E.

J. Sci. Instrum 23, 144-6 (46)

A Knudsen Absolute Manometer

A simplified Knudsen-type gage is described. The main body, vacuum connection, and hot surface are in one unit; the top plate and suspension housing complete the assembly. The dimensions of the gage and torsion const. yield the formula $p = 2.4 \times 10^{-6} d / (T_1 - T_0)$ mm of Hg. where d is the deflection in mm at 50 cm scale distance. By varying the heater current from 0.2 to 1.3 amp and $T_1 - T_0$ from 2 to 30°C a pressure range from 10^{-4} to 10^{-6} mm can be covered.

005-40- 154

07210

Wilson, C.I.

Analyst 65, 407-8 (40)

A Gas-Detection Apparatus for Qualitative
Microchemistry

The reaction vessel is a micro test tube connected to the testing chamber by a suitable glass arm. Cotton wool or glass wool is placed in this arm to retain spray before the evolved gas enters the testing chamber which is a piece of straight glass tubing. Inside this is a series of glass rings which just slide into the tubing and serve for holding the various test papers. The procedure is illus. by the detn. of AsH_3 in the presence of H_2S . The latter is removed first by passing the gas through the requisite no. of papers impregnated with $Pb(OAc)_2$ as detd. to expt. A subsequent disk is impregnated with $AgNO_3 + HNO_3$ to serve for detecting AsH_3 after the H_2S has been removed.

980-59- 900

07220

Wilson, G.G.
Hogan, D.P.¹
Matus, G. K.

Am. Gas Assoc. No. DMC - 59-32 p
D-225-41 (59)

Evaluation of Current Practices in Detection
Repair and Prevention of Gas Leaks

Summary of information obtained from literature and ten company survey relative to : location of gas leak source, repairing bell and spigot joints, in-place inspection of pip condition, and creating economical gas conduit; methods of leak detection and organization of leakage surveys, bell and spigot joint leak repair methods, and preventing buried steel pipe corrosion.

323-58-132
151

07225

Winter, P.
et. al.

Ind. and Eng. Chem. 50 53-5 (58)
Summary of Industrial Leak Detection
Processes and Detectors

Eight methods are outline (halide, Mass Spec. Tracers)and eight detectors are discussed;some commercial. This is a very general article designed to outline procedures for industrial firms to detect leaks. It gives a couple of the more common ways but also gives some rather crude ways for detecting. Among the eight methods it lists three that depend on chemical reactions which seem to be unappealing.

980-51- 800

07230

Wirth, H.

Mikrochemie ver. Mikrochim Acta 38, 268-70(5)

Simple Buret for Rapid Microdetermination of
Gases

A simple arrangement is shown which can serve as absorption pipet or measuring buret.

005-49- 154

07240

Woodward, F.N.

Analyst 74, 179-82 (49)

Colorimetric Estimation for Thiols

A method is proposed for rapidly estg. small quantities of 2-hydroxyethane-thiol (I) dissolved in 2, 2' -dihydroxydiethyl sulfide (II). To a soln contg. 0.1-0.4 f of I add avs. EtOH to exactly 50.0ml. Take 6.00 ml of the mixt. in a 10mm Hilger cuvet and add exactly 1 ml. of 4 N NaNO_2 soln. and exactly 2 ml of AcOH. Start a stop watch, mix well, and measure the red color in a spektr photo-elec. absorptiometer exactly 3 min after the addn. of the AcOH. The result obtained from an empirical curve is accurate for pure I and when more than 6.5% of II is present. A correction should be made when II is present at lower concns.

980-46- 151

07250

Worcester, W.G.

Doughty, E.G.

Trans, Amer. Inst. Elect. Engrs 65, 946-55 (46)

High Vacuum Leak Testing with the Mass Spectrometer

Requirements of a leak detector for large all-metal vacuum systems, are fulfilled to a higher degree than hitherto possible by application of a special mass spectrometer. This instrument, which is small, portable and of all metal construction, detects minute quantities of He in samples of gas continuously drawn from the system portions of which are exposed to a He jet. The design, characteristics and application of the apparatus are described in detail.

980-59- 620

07260

Wright, W.F.

Wright Instrum. Inc. Vestal, N.Y. (59)

A Survey of Pressure and Density Sensors and Associated Problems for the N.O.L. Hasp Program

Contains: Laboratory calibration, pressures switches, ionization gages, radar accuracy, analog vs digital recording, hypsometers, thermal conductivity gages, etc.

980-54- 144

07270

Young, A.C.
Robinson, W.A.

Washington, U. Seattle (54)

Small Sample Volume Infra-red Carbon
Dioxide Analyzer

A compact CO₂ analyzer using an interrupted infra-red beam is described. The sample chamber has a volume of 1cc. Ninety percent response requires a time of 1/25 sec and a volume flow of 1cc.

980-57- 153

07280

Zawisza, A.

Koks, Smola, Gaz 2. 157-65 (57)

The Chromatographic Method of Gas Analysis
and Its Industrial Uses

Principles, methods, and app. for chromatographic analysis of org. and inorg. gases and vapors are discussed.

165-44- 900

07290

Zielinski, H.H.

Electronics, 17, 112-5 (44)

Measurement of High Vacua

980-53-110 132

07295

120

Glas-u. Hochvakuum-Tech. 2, 292-4 (53)

Ziock, K.

Experiences with Various Methods and Types
of Apparatus for Leak Detection

A review of types of instruments used in the detection of leaks in vacuum systems. Among the types discussed are: thermoelec. vacuum meters with H₂ as the test gas; ionization meters, also with H₂ as the test gas; and a halogen-Pt leak detector which uses CF₂-Cl₂ as the test gas. Comparisons are made between the sensitivities of these types when they are installed various locations. All data are tabulated.